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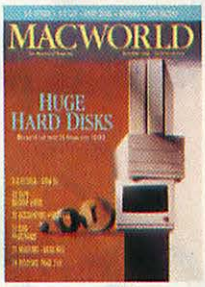

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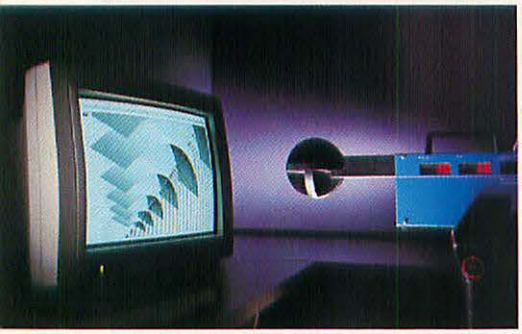
In the market for a massive drive? Check out Macworld's *top picks. See "Huge Hard Disks," page 174. (Photo by Paul Franz-Moore.)*



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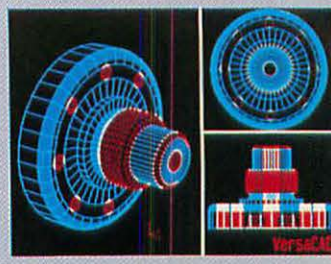

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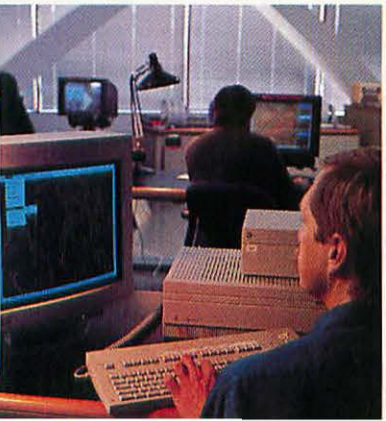

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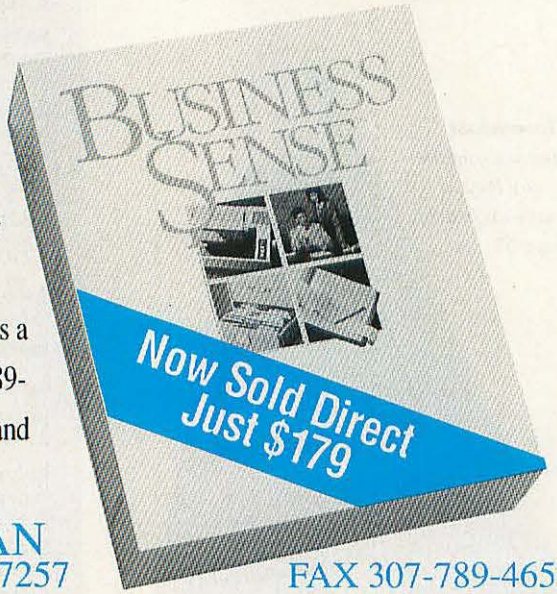

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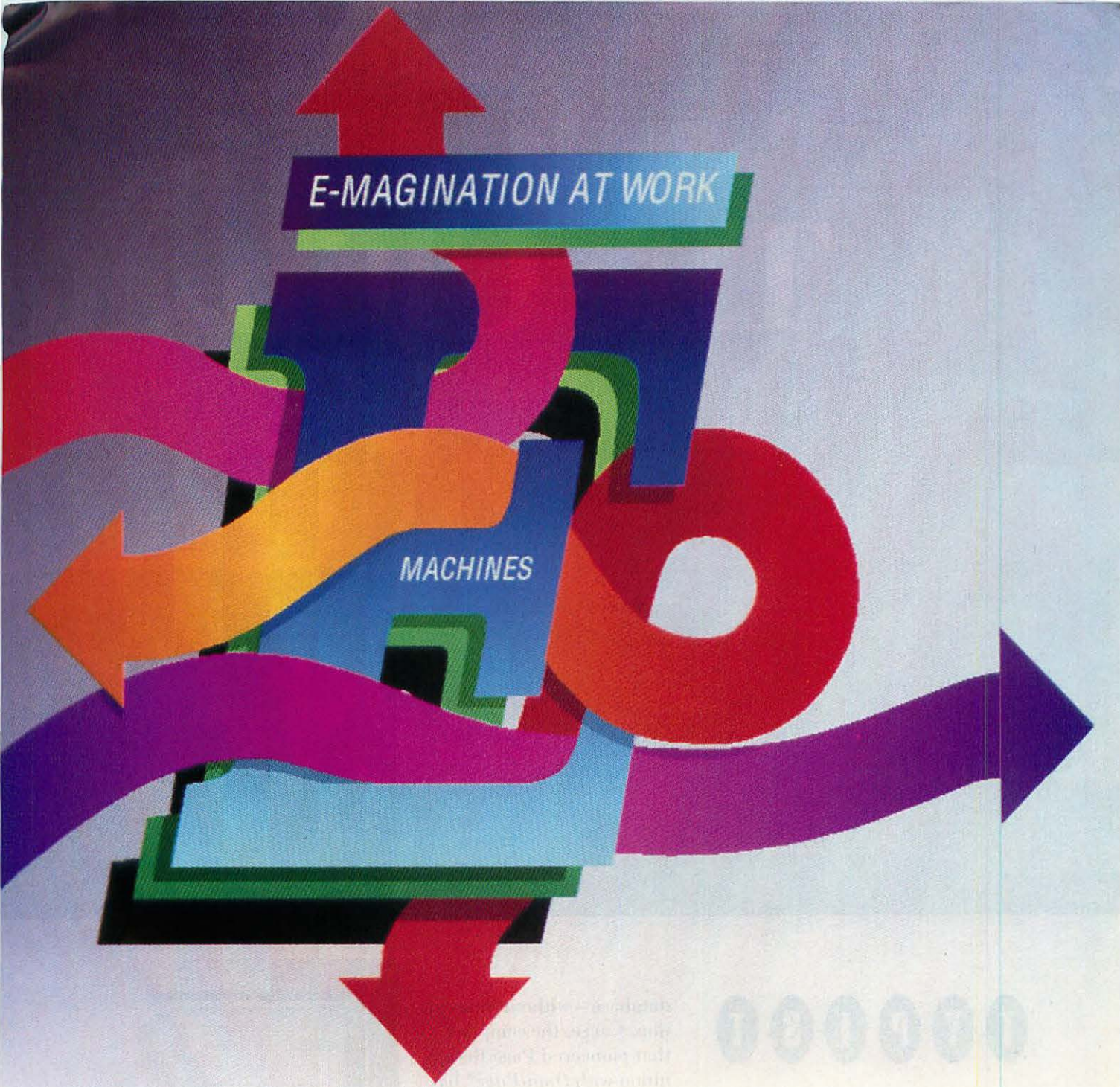

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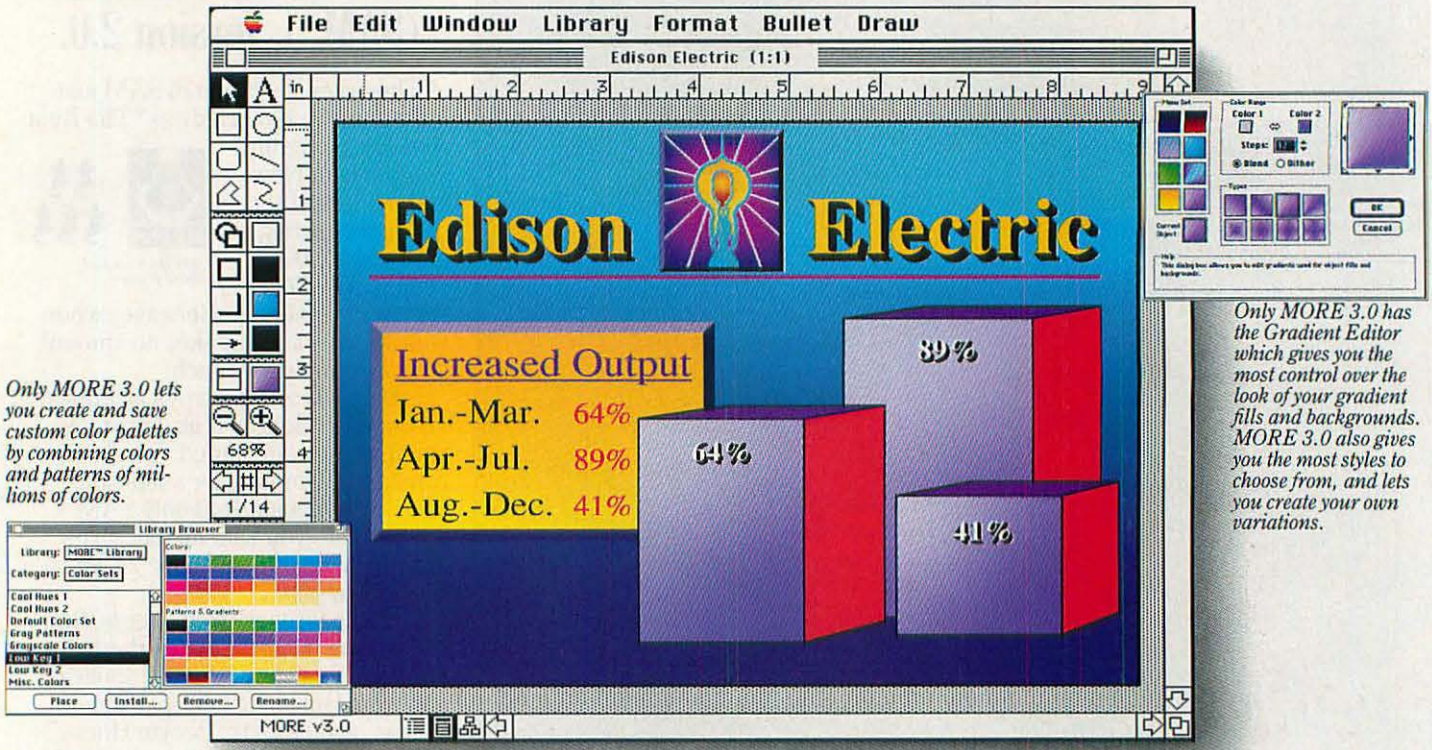

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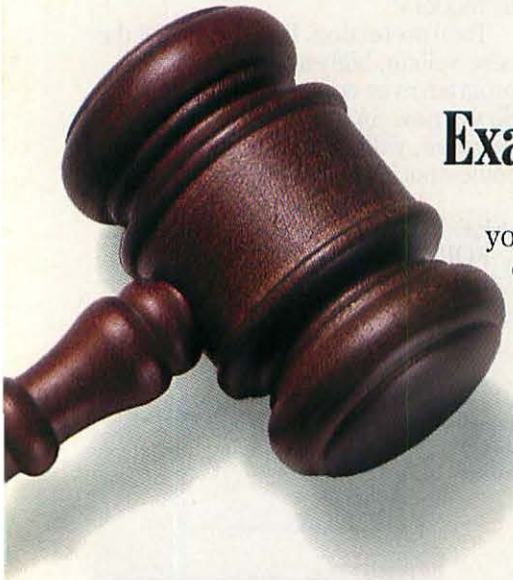

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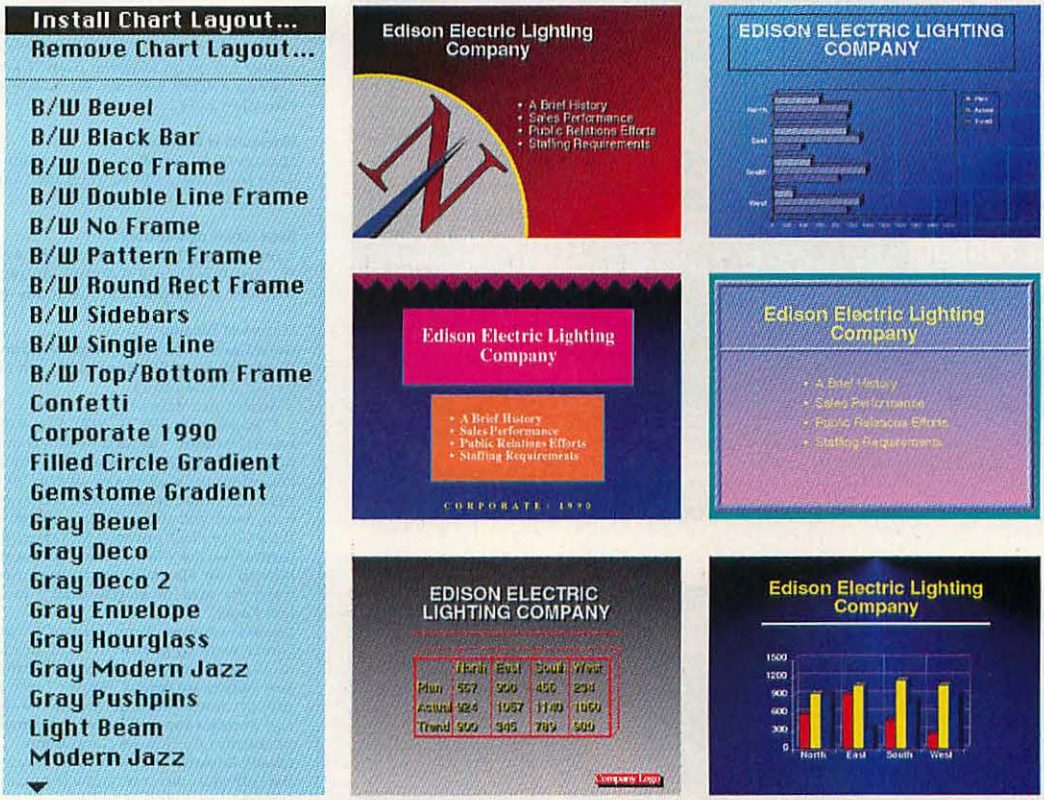

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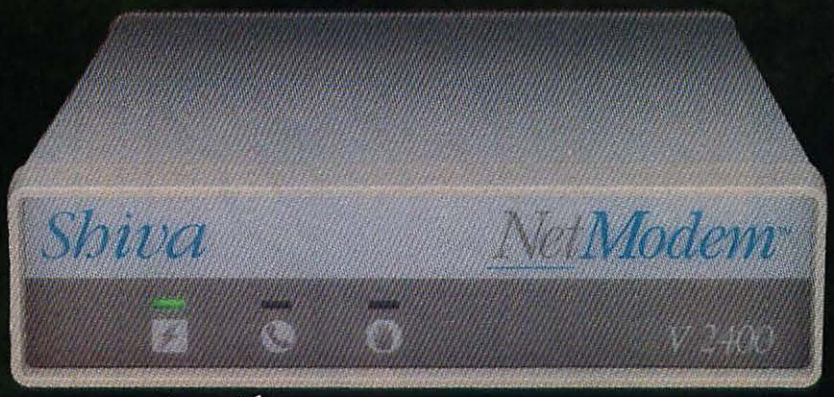

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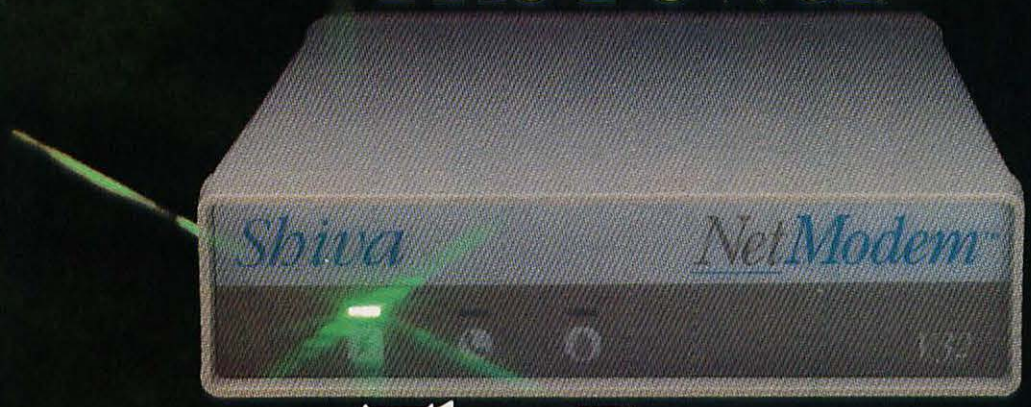

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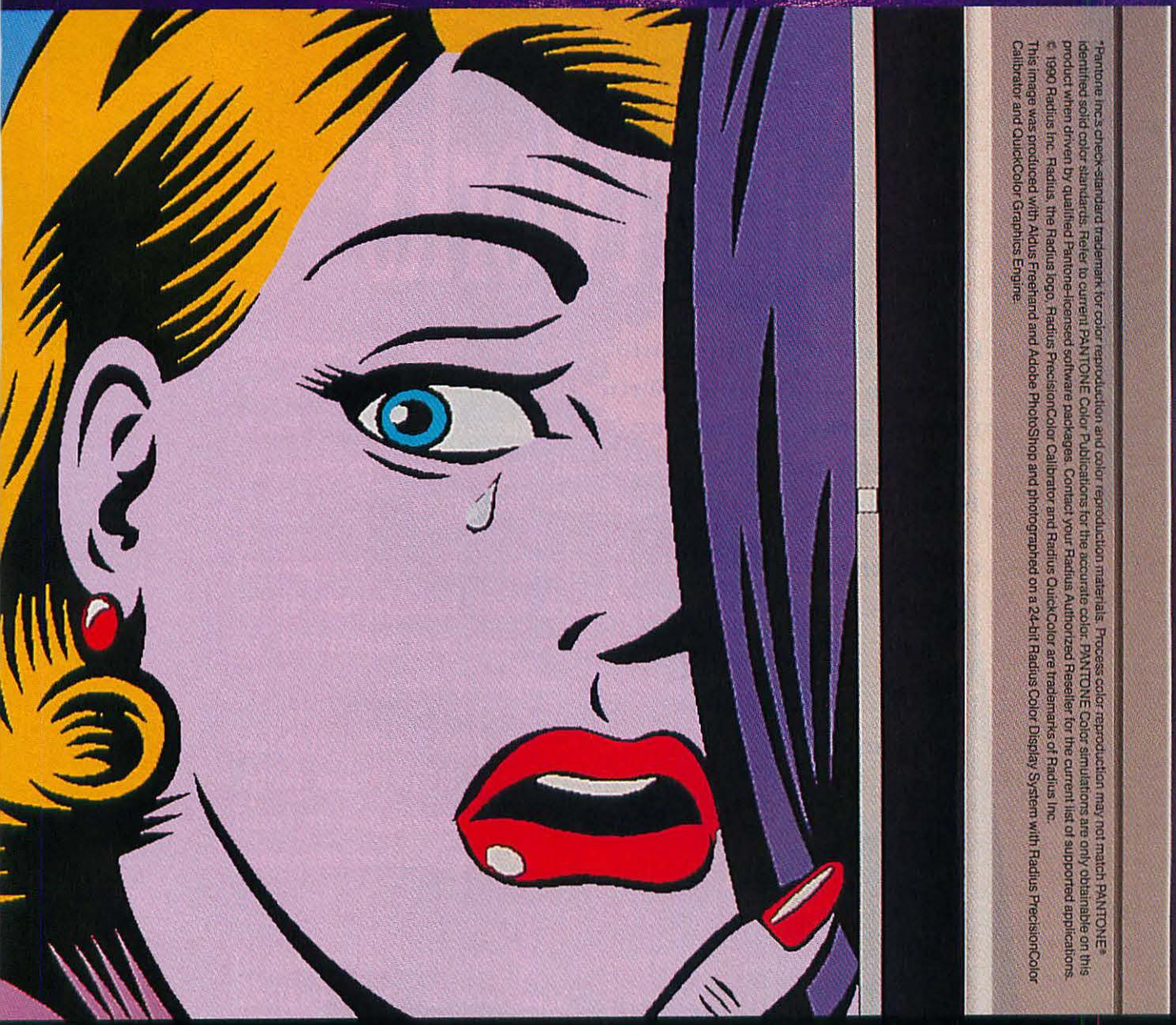

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MACBULLETIN

Apple Replaces Faulty CD ROM Disc for Developers

Apple has sent out a corrected version of Discy Business, an Apple CD ROM disc for developers that causes Mac IIs to crash if it's fully inserted in the CD ROM drive during start-up. Anyone who has not received the corrected disk can avoid the problem by inserting the faulty disc into the drive after start-up. The corrected Discy Business bears the subtitle The Real One.

HP to Replace Faulty Power Supplies in LaserJet IIP

Hewlett-Packard has announced a recall of approximately 70,000 Hewlett-Packard IIP laser printers because their power supplies may suddenly fail. The power supplies are all in early models of the IIP purchased before March of 1990. The power supplies are not faulty if the printer's serial number begins with 3. HP has set up a number, 800/233-5153, to call to find out if your IIP has a defective power supply. If you have one of the bad power supplies you can either contact your dealer or an HP customer-service center and have the power supply replaced for free, or you can return the printer to HP and receive a remanufactured printer at no cost. In the latter case, HP covers all shipping costs and renews the warranty to one year. The company says that the flawed power supplies represent no safety hazard.

E-Machines' TV Board Does Special Effects

On October 3 E-Machines will introduce the QuickView Studio board, which supports real-time video, editing, and special effects on Mac IIs. The NuBus board can display two live 16-bit video windows and can execute warps, 3-D rotations, and horizontal and vertical flips. The product includes QuickView Studio Editor, software that performs text overlays and masks. Video sequences or single frames can be captured and imported into MacroMind Director for animation and further manipulation. QuickView Studio works with 16-inch and 19-inch color displays from E-Machines and with the Apple 13-inch color monitor. The product should be available in the fourth quarter at a list price of $2495. For more information, contact E-Machines at 503/646-6699.

Low-Cost PostScript Printer Produces 6 ppm

NEC Technologies recently unveiled the SilentWriter2 Model 90, a 6-pages-per-minute PostScript laser printer that lists for $2495. The device uses PostScript 52.2 and includes 35 Adobe fonts. Designed to work with Macs or PCs, the Model 90 contains an HP LaserJet IIP emulation program in ROM and has separate screen fonts for QuickDraw and Microsoft Windows. Its Minolta print engine has an estimated life of 180,000 pages, NEC said. Mainly intended as a standalone printer, the Model 90 comes with a Centronics parallel port, and RS-422 and RS-232C serial ports. NEC has scheduled initial shipments for September 1. For more information, contact NEC Technologies at 800/632-4636 (or 800/325-5500 from Massachusetts or Canada).

Soft Plans

Planisoft is a time-scheduling and -management utility that can share multiple agendas between Macs and IBM PC–compatibles running Microsoft Windows. As you schedule slots on the weekly calendar you can color-code them and assign them deadline, priority, or to-do status. Colleagues on the network can examine your calendar and see when you are busy, though without password clearance they won't see exactly what you are doing. Planisoft also can create groups, using color overlays to combine individuals' agendas to schedule meetings and manage facilities. Planisoft lists for $249 for one user, $895 for five users, and $1295 for ten users and requires a server or distributed network system such as AppleShare, TOPS, or NetWare. For more information, contact asd Software at 714/624-2594.

Video in HyperCard

A set of two XCMD-laden stacks collectively called VideoAuthor will simplify using video, sound, animation, and other data formats in interactive HyperCard stacks. VideoMaker is for creating and sequencing video clips using most Mac-compatible video-capture and special-effects boards, and then installing clips in stacks as buttons. Interface Constructor is for designing and constructing stacks that incorporate VideoMaker clips, sound, and other formats, and then adding overlays, titles, and special effects. Interface Constructor also provides check boxes, menus, and other interface objects. The VideoAuthor suite lists for $395 and works with HyperCard 1.2.2 or later. For more information, contact HyperPro at 408/446-4800.

Art 54 Where Are You?

Multi-Ad Services, which publishes the advertising de-

(continues)

sign–oriented page-layout package Multi-Ad Creator, is about to publish Search, a system for cataloging and retrieving clip art on a network. Search creates catalogs with thumbnails, keywords, and text descriptions for up to 32,000 pieces of art; a catalog and the corresponding artwork do not have to be on the same machine. Search works with any random-access media including CD ROM discs, searches keywords using Boolean operators, and sends 1K thumbnails across the network for the searcher to examine. Multi-Ad says several clip art vendors plan to sell clip art on CD ROM discs with Search catalogs embedded in them. Search will list for $199. For more information, contact Multi-Ad Services at 309/692-1530.

Digital Darkroom Does Color

Digital Darkroom 2.0 won't compete with full-color programs like Adobe Photoshop or ColorStudio, but it supports color highlighting by placing tinted patches over gray-scale images. In addition, it features printer and scanner calibration, it can transform images (stretch, rotate, and so on) in real time, and it can open more than one document at a time. Version 2.0 needs less memory than earlier versions because its undo buffers are disk-based. Digital Darkroom's price remains at $395, and upgrades are $75. For more information, contact Silicon Beach Software at 619/695-6956.

Colors of the Day

A new company called Pastel is entering the Macintosh market with Pastel Manager, a free-form database designed as a personal information manager. Pastel Manager entries are defined as either calendar items or note items and can have user-defined categories attached to them. By manipulating date items, the contents of notes, and their categories, users can extract information such as a list of meetings scheduled for a certain day or a summary of tasks required to complete a certain project. Pastel Manager also provides form-design tools, pop-up alarms, and a Gantt chart view of schedules. For more information, call Pastel at 212/431-3421.

Jasmine Bounces Back

A newly reorganized Jasmine Technologies is offering a low-cost line of hard drives in addition to its established line of Platinum Flower products. Available in October, the new Blue Flower line offers 40MB and 80MB hard drives for $399 and $449, respectively, and includes a one-year warranty. Jasmine has also relaunched its DirectServe server in a "bug-free" version. The product, renamed LocalLink, will be sold in tandem with a 130MB or larger drive, at prices beginning at $2399. Early versions of the server had serious software problems; Jasmine said these have been resolved and that updates are being sent to owners. No longer a direct-sales-only company, Jasmine is asking dealers to sell its InnerDrive series of internal drives and more sophisticated products, including upcoming 680MB and 1100MB drives (which will also be available directly). And company officials say Jasmine's repair backlog is diminishing as they ship some 35 refurbished drives per day back to owners.

Helix Makes Another Loop

Version 3.5 of Odesta's icon-based relational database Double Helix adds several new features. In multiuser situations it supports multithreaded searching. Data structures for Double Helix VMX are stored on the Mac instead of being downloaded from the VAX at each session. The 64K size limit on images has been eliminated. Changes programmers will appreciate include support for optimizing OR queries; addition of radio buttons and check boxes; improved control over tab order; and the ability to launch a query by entering a field. Double Helix's price remains $595. For more information, contact Odesta at 708/498-5615.

Life at Letraset

Letraset laid off some marketing and administrative staff over the summer; brought the ReadySetGo and DesignStudio authors in-house from Manhattan Graphics; and slashed ReadySetGo's price to $295 from $495 and ColorStudio's price to $995 from $1995. ColorStudio 1.1 adds many new features, including new filters such as Impressionist, Pixelate, and Oil Paint; support for the pressure-sensitive Wacom tablet; improved control over color screen angles, color correction, and output; and control over which channel a color is in. Finally, a FontStudio upgrade planned for October will save in Type 1 format. For more information, contact Letraset at 201/845-6100.

MacTendo?

Transfinite Systems Company has introduced the Gold Brick, a device that allows users to connect Nintendo Entertainment System controllers to the Apple Desktop Bus (ADB) port found on the Mac SE and Mac II families. Compatible Nintendo input devices include Brøderbund's Uforce, Nintendo's Power Pad, Enteractive's Roll&Rocker, and the Power Glove from Mattel. Once attached via the Gold Brick, the Mac can translate input from one of these devices into 2-D or 3-D motion and keyboard commands. For more information, contact Transfinite Systems Company at 617/969-9570.

Smooth Operator

VideoLogic has introduced the DVA-4000, a digital video adapter that provides interactive control of windowed, full-motion video on the desktop. The NuBus board permits dynamic resizing and repositioning of video images, and features its own high-speed processor to handle all video processing. Crossfade and dissolve facilities allow users to control the

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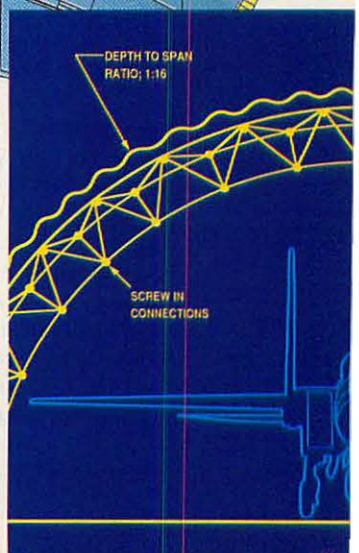

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level and duration of fade of video, graphics, and audio. The DVA-4000 supports input from laser discs, camcorders, and VCRs in both NTSC and PAL standards. For more information, contact VideoLogic at 617/494-0530.

Taps For AppleFax

It's been pulled off the market at least once before, but this time it's for good. Citing the growing number of available third-party fax modems, Apple has discontinued its AppleFax Modem. The much-beleaguered AppleFax was beset by bugs, incompatibilities, and underpowered software during its troubled but tragic life.

Quantum Unveils 2 1/2-inch Hard Drives

Leading drive vendor Quantum recently introduced its Go Drive Series of 2 1/2-inch hard drives, designed for low-power, portable applications. The first two drives in the series store 42MB and 84MB of formatted data, respectively. Quantum also unveiled its ProDrive Gem series of low-power, quarter-height 3 1/2-inch drives, also intended for use in battery-operated portable systems. Volume production for the Go Drive 40 and the 84MB and 168MB ProDrive Gem drives is scheduled for March 1991. Since Quantum sells its drives largely through third-party vendors, expected retail prices were not available at press time.

News of Ashton-Tate

Ashton-Tate has announced two new products. FullWrite 1.5 supports dragging sidebars on the page and adds a file-conversion utility; the program's price remains $395. dBase IV RunTime Plus version 1.1 is a complete Macintosh implementation of dBase and supports writing and using dBase-language applications on the Mac. A version with a Mac interface is under development. Pricing was undecided at press time. For more information, contact Ashton-Tate at 213/329-8000.

Oracle, the Sequel

Oracle has announced a Macintosh server based on Oracle's version 6.0 standard. It provides full transaction processing, administration software, and a full set of query and development tools. Pricing was not set at press time. For more information, contact Oracle at 415/506-7000.

The Paper Screen

Farallon's new DiskPaper is intended to give on-screen documents all the advantages of paper documents. DiskPaper documents are created by printing files from any application to disk with a special Chooser device. You can incorporate a free viewer engine in DiskPaper documents; add sounds; control how fonts and color images are managed, to compensate for different hardware or software; and set controls that prevent the DiskPaper document from being opened without a password, being printed, or being copied to the Clipboard. DiskPaper documents can also be searched for text. DiskPaper will probably list for about $100. For more information, contact Farallon at 415/596-9100.

Fonts of the World, Unite

Linguist's Software has released LaserVietnamese: special versions of Adobe Palatino, Times, Helvetica, Bookman, and Zapf Chancery with Vietnamese diacriticals. Linguist's publishes 130 specialty fonts including Greek, Sanskrit, Hebrew, Kanji, Cyrillic, Arabic, Gardiner's hieroglyphics, and mathematical characters. All are Type 1 or Type 3. Prices range from about $50 to about $120 and, where appropriate, include the local operating system (OS), an OS-switching utility, and a text-editor called Miniwriter that has right-to-left and 2-byte-character capability. For more information, call 206/775-1130.

New QuicKeys Records Macros

Version 2.0 of QuicKeys adds two new kinds of QuicKeys and several other features. Real Time QuicKeys are true watch-me record-and-replay macros with a macro editor; Externals are pieces of compiled code that QuicKeys can launch. (CE Software is recruiting software publishers to include Externals with applications.) You can set sequences to run at certain times and filter the list by type when looking at a key-set. Also, intermediate steps in Sequences do not need key assignments. The new version will list for $149.95. For more information, contact CE Software at 515/224-1995.

Animation on the Move

Gold Disk is developing two animation packages for the Mac, one that will list for $195 and another for less than $500. The $195 Animation Works provides path motion and registered motion (past and future frames are visible to help position an object), hierarchical paths, a full 8-bit cel-editing environment, XCMDs for including animation in stacks, and storyboarding. The as-yet-unnamed high-end package adds antialiasing, improved wipes and transitions, animated mattes, 24-bit color, and button-based interactivity (there is no scripting). Neither product supports 3-D modeling. For more information, contact Gold Disk at 213/320-5080.

Spare Changes

Paracomp has acquired marketing rights to the French animation package FilmMaker and is cutting its price to $695 from $1995. Business Sense has changed hands yet again: Wyoming-based Inman Software (307/789-7257) is taking it over from Monogram and Digital Etc. and is cutting the small-business accounting package's price to $179 from $495. Microcom has acquired all of 1st Aid Software's products and may revise 1st Aid Kit to compete against Symantec's SUM II, Norton Utilities, and Central Point Software's MacTools Deluxe. ■

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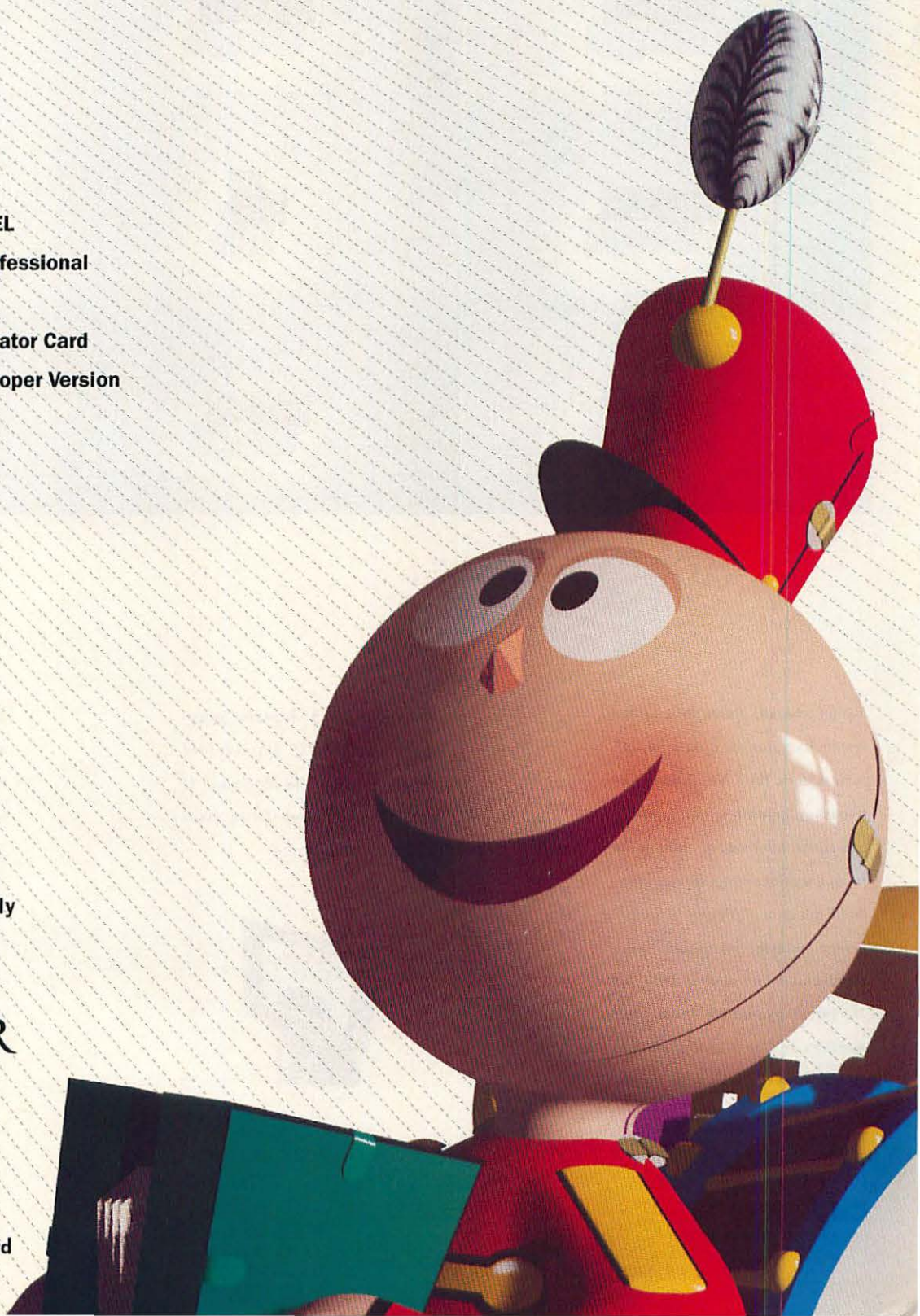

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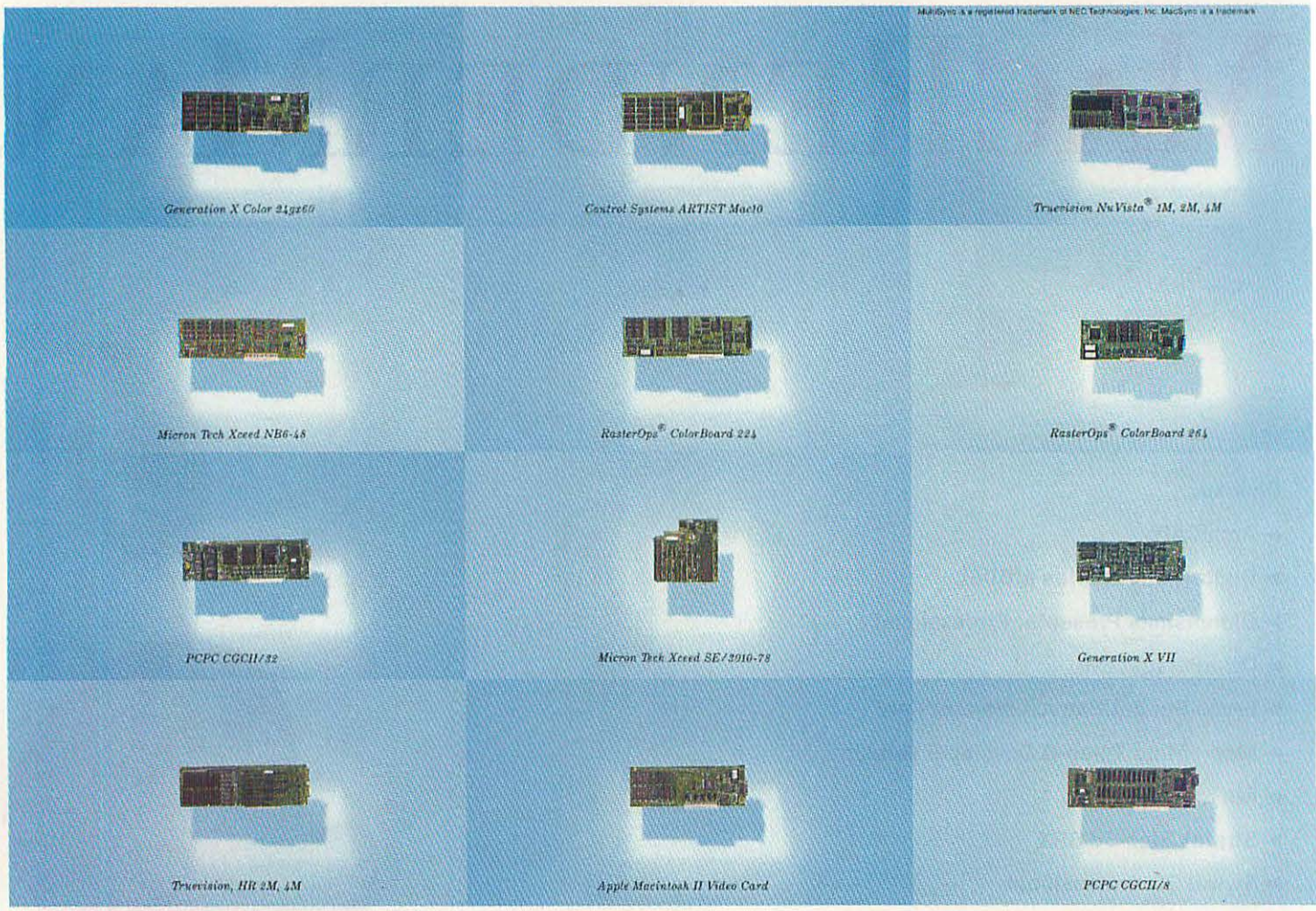

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Expo on My Mind

THE NEW PRODUCTS KEEP COMING

BY JERRY BORRELL

There I am, standing in someone's booth at the Macworld Expo in Boston, dressed up and feeling like the nerd that I am. "So, seen anything new? Like some really big hard disks?" asks Mike Boich, president of Radius. Since Mike is in the process of making a few million taking his company public, I joke back: "Lots. So you worth about $5 million or $6 million now?" "Worst case," says Mike. Flash to the old "Saturday Night Live" routine: Macintosh been berry, berry good to Mike. The machine may have consumed people's lives, but unlike most other personal computers, the Mac has made many people very wealthy.

Mike was Steve Jobs's prototype evangelist. He's seen lots of products; okay, maybe too many products. Occasionally he says things to me like, "Hey Jer, get a life." He has a sardonic outlook on technology that allows him to keep life and the Macintosh in perspective. Even I find it hard to get excited in some instances, but this summer's big Mac computer show was exceptional. Not just lots of people but lots of good products. And lots of anticipation of Apple's announcements of new computers.

They're Back

Jasmine, the little company that could, is back with a passion. Under new management, the company's trying to recapture its success. Ashton-Tate sold dBase Mac to New Era of Miami. Preferred Publishers retrieved Cricket Paint and Cricket Draw from the neglect of Computer Associates and is selling updated versions of both.

Ehman, the Wyoming company that is on a mission from God to make the Macintosh peripherals market look like the IBM PC peripherals market (that is, cutthroat and cost-competitive), has changed the nature of at least one aspect of the Mac arena—hard disk drives. In the face of rock-bottom prices like $399 for a 20MB and $499 for a 40MB internal drive, many manufacturers of hard drives have announced second product lines with lower prices (and cheaper components). Peripheral Land has had a second, lower-cost product line for some time. Jasmine, Microtech International, Rodime, and Procom are now offering both low-cost and more expensive product lines.

Something similar has been occurring in the market for monitors. Lapis, Ehman, Nutmeg, and others have been driving the market at the low-cost end for some time now. At the show you could buy a monochrome portrait monitor and video card from Lapis for only $549. That compares with a $2000 solution from Apple only last year.

I'm not saying I would buy the lowest-priced peripherals in all cases, just that the price of some technologies is moving down rapidly.

Some Really Big Hard Drives

Sure, there were megagigabyte hard drives. But the real change is coming as a result of users who buy 60MB to 100MB drives. And of businesses buying 300MB to 600MB hard drives. In-

dustry pundits love to cite consumers' inexhaustible demand for processing power. I want to point out that we have an inexhaustible demand for storage as well. The graphics market in particular is driving the demand for storage—and the Macintosh is the driving force in the mass market of graphics users today.

Manufacturers of tape storage devices (the favorite backup device of business) announced 8mm tape drives less than two years ago. This year four companies were showing 4mm tape drives. Overall, the 4mm technology is the smallest (in physical size) and largest (in amount of storage) on the market.

I often write about erasable optical drives with enthusiasm. So at each trade show, you can find me looking for the latest products—in particular I'm excited about 3½-inch optical disks. Both Pinnacle and Ocean MicroSystems have shown 3½-inch optical drives at Macworld Expos. The removable media store 128MB on a single disk. Still, I'm told, neither company can send one to my office.

(continues)

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Input Devices

I don't want to be the first kid on my block to say the emperor has no clothes, but what the heck are we all going to do with these hand-held scanners? I counted at least ten companies selling three different approaches to hand-held scanning devices. Caere has added some spark to the market by adding OCR software to its scanner. I managed to make the device goof by running the scanner too fast; maybe Caere will improve that. Mouse Systems has a hand-held scanner like many others, but the company's software allows the user to run the scanner all over an image, and then software sorts out the parts that are being scanned twice. That seems useful to me. But I wonder, are the manufacturers of hand-held scanners hoping they will have a role in professional applications? Check an upcoming issue of *Macworld* for the answer.

Cordless graphics tablets have come of age. Wacom, which popularized the idea, has been followed by Kurta. The award for most weird and wonderful input device goes to Transfinite Systems for its Gold Brick software and ADB component. With Gold Brick the Nintendo Uforce peripheral can be added to a Mac to enable users to manipulate 3-D objects in 3-D space. Using it makes you feel like a character in a 1950s science fiction film.

Video and Monitors

Monitors were everywhere. The developers of graphics boards and monitors have built a $300 million market on the Mac. Three of the first publicly held Mac developers have come from this market: RasterOps, Radius, and Mass Microsystems.

Still, I was not prepared for the bewildering array of offerings from developers. Video is the hottest area of the graphics hardware market. Camera–input software combinations are now available from Radius, SuperMac, RasterOps, Aapps, Truevision, Orange Micro, Mass Microsystems, Workstation Technologies, Computer Friends, Data Translations, Digital Vision, and others. Originally Mac video products captured frames of video for redisplay. Later a few products allowed graphics produced on the Mac to be overlaid on

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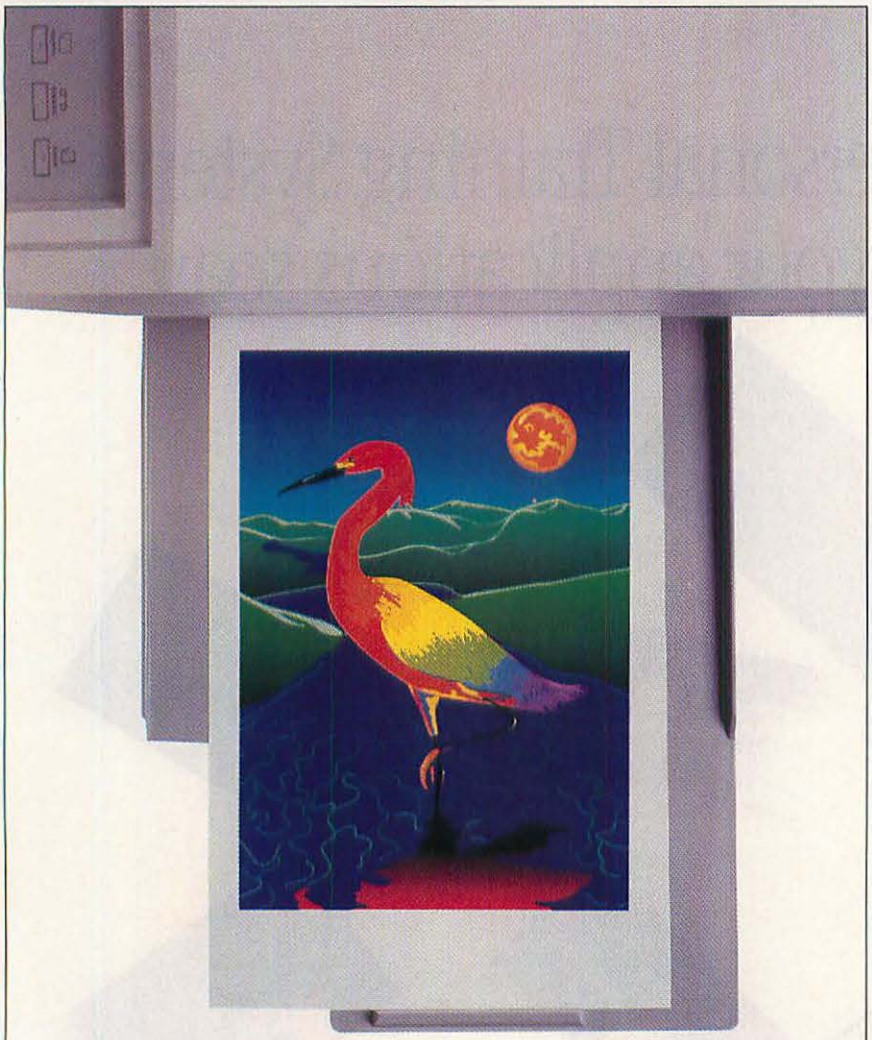

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video. Then came the breakthrough of real-time video display on the Mac. At the August Expo we saw devices that integrate video input, video output, titling, and special effects on complex NuBus video-board sets. Again, the third-party developers have beaten Apple to the punch with video products. Apple is readying video capture, display, and image editing/manipulation products for release in 1991. Still, independent developers show every sign of being able to stay several moves ahead of the Apple.

A final note on display technologies: I saw two color LCD display panels for use with overhead projectors that are the first of their kind I would want to own. These new products from Proxima and In Focus are actually capable of showing rich color palettes.

Graphics and Imaging

Some computer industry critics openly fear that Apple is allowing the Mac to be positioned as a niche-market machine for graphics. My point of view is that the Mac is superbly positioned to be the most graphical of computers—and potentially is in a position to benefit as those graphics open new fields of use for the Mac in entertainment, the sciences, design, publishing, and many other fields.

Having Pixar—winner of an Academy Award for animation, scion of filmmaker George Lucas, and all-around groundbreaker in image synthesis—make the decision to quit building hardware and concentrate on writing software for the Macintosh is reason alone to celebrate. But there's also Topas (from AT&T Graphics Software), the software known for extraordinary rendering, being ported to the Mac. VIDI has vastly improved the rendering capabilities of its Presenter package. Strata has added faster and more advanced renderers to its software. And Paracomp is now shipping another version of Swivel 3D, Swivel 3D Professional.

Data Compression

The downside of all the progress being made in video and graphics is that the multimegabyte images being produced are too large to display, transmit, or handle conveniently. That's

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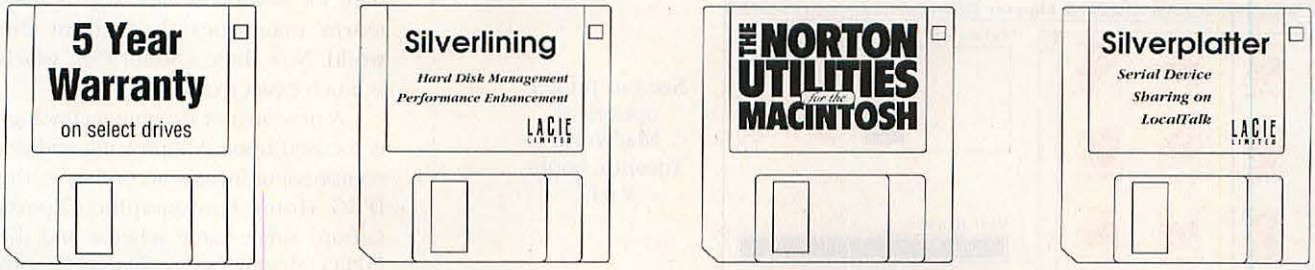

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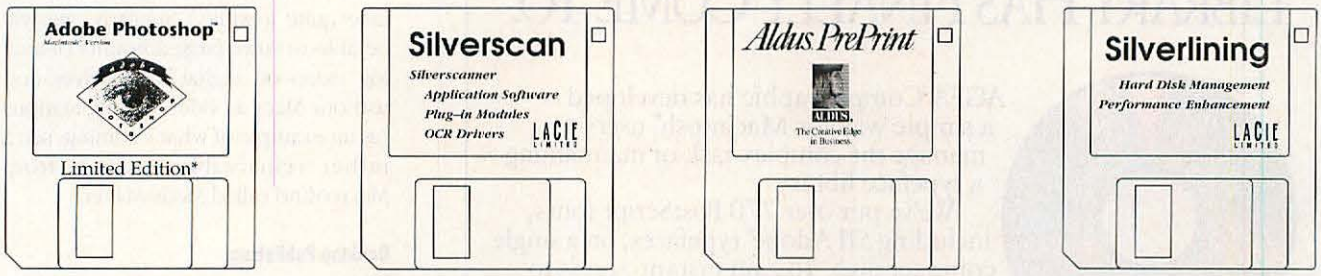

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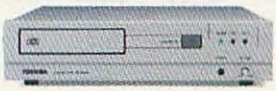

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where image compression comes in. We have had Aladdin's StuffIt in use here for *Macworld* files sent to *Macworld* magazines throughout the world. Now there's Stuffit Plus, which is much easier to use.

A new area of imaging technology is focused upon compressing and decompressing images according to the JPEG (Joint Photographic Experts Group) single-frame scheme and the MPEG (Moving Picture Experts Group) video-sequence scheme, standards in draft stages with the American National Standards Institute. C-Cube was the first to develop silicon chips, NuBus boards, and software intended to serve the market. At the Expo, Micron demonstrated a compression NuBus board using Storm Technology Software. Also at the show SuperMac demonstrated, but did not explain, prototype hardware and software for the compression and decompression of video.

And there are several other companies, such as Newbridge and Creative Solutions, at work on how to shrink and reconstitute large image-data files in real time. Once this is accomplished (in six months), perhaps we will be able to transmit 40MB images over standard phone wires and decompress them at a remote location in an instant. (Well, sort of—transmission at 9600 baud will take quite a while.) Similarly, we will be able to store large amounts of analog video on digital hard drives and use our Macs as video editing stations (as an example of what's coming, see a rather remarkable product from MacroMind called MediaMaker).

Desktop Publishing

What computer exposition would be complete without announcements from our friends in DTP? One answer: The same kind of show that would see little progress with desktop presentation. But let's not dwell on Microsoft's inactivity with PowerPoint or Aldus's needed improvements to Persuasion.

Frame demonstrated a very solid looking version of its soon-to-be-published product. Ventura demonstrated a very solid looking beta of its . . . to-be-published product. Quark showed and is shipping QuarkXPress 3.0, a product that should have Aldus looking very hard over its shoulder.

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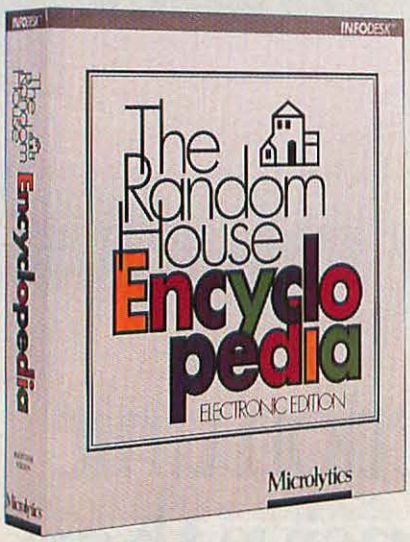

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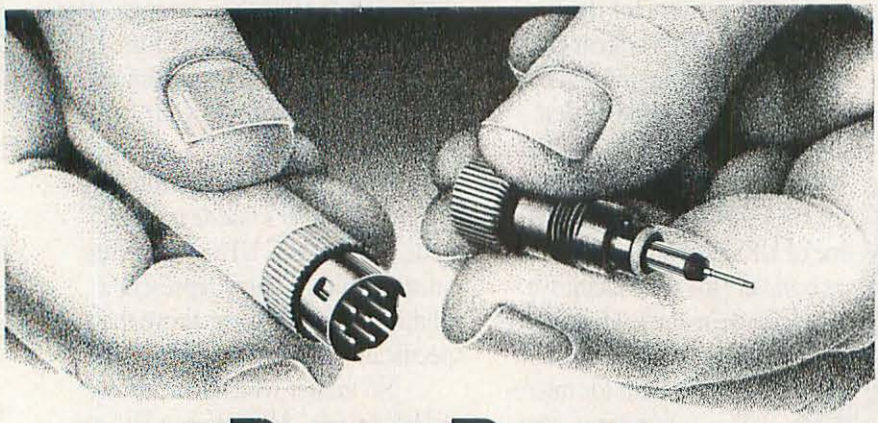

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QuarkXPress 3.0 is going to be the stiffest competition that Aldus PageMaker has ever had. Quark has finally gotten it together to compete on all fronts with Aldus.

One interesting tangential development arena for DTP is that of color matching. Radius and E-Machines have joined together to share technology for RGB and CMYK color matching, which they say is based on a unique license of the Pantone system. SuperMac, meanwhile, announced a host of cooperating developers for its own scheme of RGB and CMYK color matching.

(A personal plea to Mike Boich, Mike McConnell, Steve Vollum, and Kieth Sorenson: please get together and talk to one another about this.

Many of the most encouraging CD ROM products are awaiting the release of HyperCard 2.0

Color is confusing enough. Don't start creating software wars for us poor users.)

My award for neatest product of the show (DTP category) goes to the latest version of S. H. Pierce & Co.'s PosterWorks, which (in combination with Freedom of Press from Custom Applications) enables users to print out graphics files to large printers (such as Versatec electrostatic printers) for output up to billboard size.

Color Printers

I was really pleased to see how much progress is being made in color printers. Seiko announced a $6999, A-size PostScript-compatible printer; the B-size version costs $9999. Meanwhile, QMS is shipping a $7999 A-size model of its color PostScript printers. Look for our February article on color printers to sort all of this out for you. The good news is that prices for color printers are falling. This is yet another arena in which Apple has held off an-

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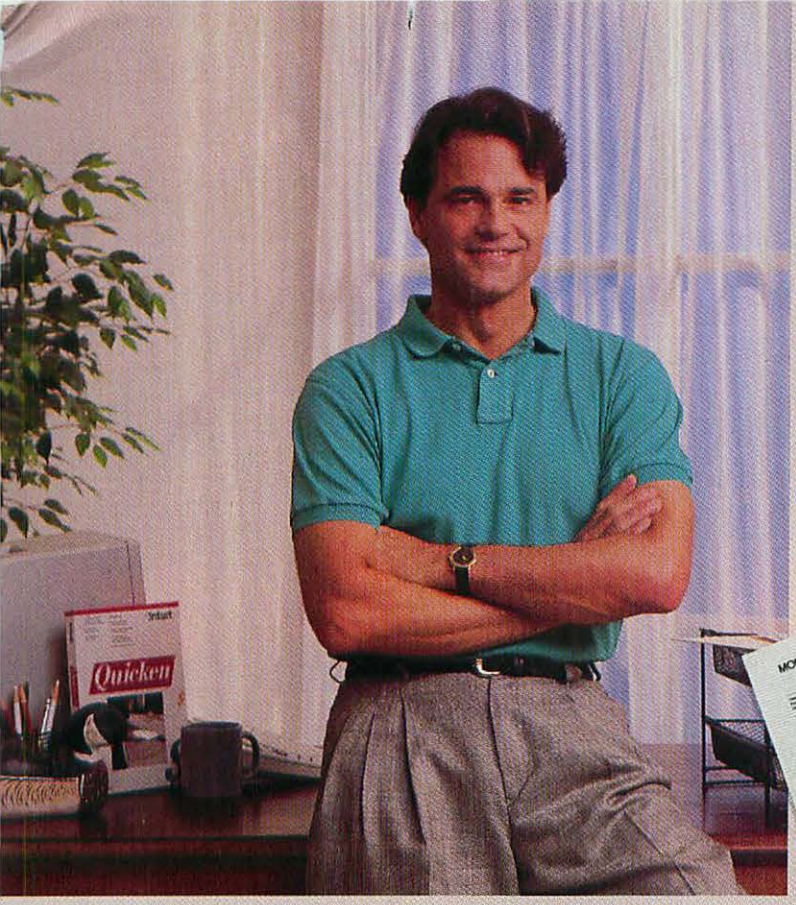

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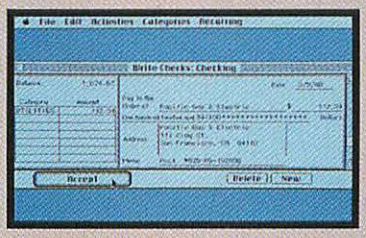

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4196 FileMaker II *(free upgrade to Pro)* . 218.
1125 MacProject II 2.1 ..... 365.
Computer Associates/Bedford
4977 ACC PAC Simply Accounting 1.1A 225.
★Deneba Software ... 30 day MBG
4700 BigThesaurus 1.0 ..... 64.
1768 Coach Professional 3.1 ..... 124.
★Dow Jones ... 30 day MBG
1786 Market Manager PLUS 2.03 ..... 189.
★Electronic Arts ... 30 day MBG
1543 Thunder II 1.01 *(Batteries Included)* 49.

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★Help Software ... 30 day MBG
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4955 Wingz 1.1A ..... 245.
★Intuit ... 30 day MBG
2425 Quicken 1.5 ..... 35.
★Layered ... 30 day MBG
5207 atOnce! 1.1 ..... 285.
Insight Expert Series ..... *ea.* 395.
2608 FrontDesk 6.10 Multi-User *(single)* . 59.
★Lifetree Software ... 30 day MBG
6984 Correct Grammar 1.07 ..... 49.
★Mainstay ... 30 day MBG
7718 MacFlow 3.1.5 ..... 125.
7715 MacSchedule 2.0.4 ..... 125.
7716 Mark Up 1.0.3 ..... 152.
★MECA ... 60 day MBG
2796 Managing Your Money 3.0 ..... 135.

Lifetree Software ... 30 day MBG
6984 *Correct Grammar 1.07*–Rated top grammar checker (4½ Mice) by *MacUser* (6/90). Checks each sentence & highlights mistakes in grammar, style, punctuation & spelling. Suggests corrections before your boss does ..... $51.

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2733 WordFinder 2.0 ..... 34.
7506 Inside Information ..... 68.
7820 Random House Encyclopedia .... 68.
★Microsoft ... 30 day MBG
2866 File 2.0A ..... 123.
2884 Works 2.00B ..... 179.
4969 Word 4.0A ..... 245.
2865 Excel 2.2A ..... 245.
5454 The Microsoft Office ..... 525.
6382 The Microsoft Office *(CD-ROM)* ... 599.
Microsoft Press
7680 Word on Apple Mac Book ..... 18.
7681 DTP by Design for Aldus PageMaker 18.
6500 Excel Money Mgr. Book *(incl. disk)* . 25.
★New Horizons ... 30 day MBG
6262 WordMaker 1.0.1 ..... 65.
★Niles & Associates ... 30 day MBG
5048 EndLink 1.1.3 ..... 58.
4602 EndNote 1.2.3 ..... 74.
★Nolo Press ... 60 day MBG
4228 For the Record 2.0 ..... 30.
2981 WillMaker 4.0 ..... 37.
★Odesta ... 30 day MBG
5621 Double Helix III 3.0R6 ..... 389.
6468 DataDesk 3.0 ..... 459.

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7698 *Fast Forms 2.0*–Quickly create, fill, print, & save professional-quality business forms. $105.

7696 *Calendar Creator*–Creates & prints calendars in a variety of formats–from daily to yearly. 35.

Paragon Concepts

5683 Nisus 3.0 ..... 245.

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7694 Address Book Plus ..... 52.

7695 Address Book Plus with Binder .... 75.

7698 Fast Forms 2.0 ..... 105.

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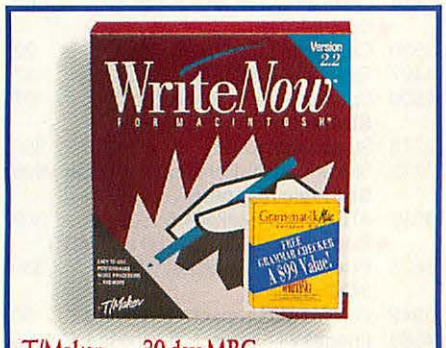
4781 Vantage 1.5 ..... 52.

7650 Direct Mail 1.0.2 ..... 52.

4780 DAtabase 1.5 ..... 68.

★ProVUE ... 60 day MBG

4582 Panorama 1.5 ..... 245.



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★Shana ... 30 day MBG

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7692 Informed Designer ..... 159.

★Softstream Int'l., Inc. ... 30 day MBG

5439 Endeavour Planner 1.0 ..... 89.

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7129 Accountant, Inc. Professional 1.03 345.

★Spinnaker ... 30 day MBG

6508 The Resume Kit ..... 35.

★Survivor Software ... 30 day MBG

6097 InvoicIt 1.01 *(reqs. MacMoney)* .... 49.

3289 MacMoney 3.5 ..... 59.

★Symantec ... 30 day MBG

3422 More 3.0 ..... 265.

★Symmetry ... 30 day MBG

4504 Acta Advantage 1.02 ..... 63.

6069 KeyPlan 1.0 ..... 243.

★Synergy ... 30 day MBG

6617 KaleidaGraph 2.0.2 ..... 145.

★Systat, Inc. ... 30 day MBG

7409 Fastat - Coprocessor 1.1 ..... 159.

7410 Systat 5.0 ..... 599.

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2986 Timeslips III 2.0 ..... 195.

★T/Maker ... 30 day MBG

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7360 WriteNow 2.2 Corporate 3-Pak ... 245.

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6742 Desk 1.0 ..... 229.

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6509 MicroTV ..... 265.

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7114 DigiVideo Color ..... 639.

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5750 Adobe Type Manager 2.0 ..... 55.

6053 Adobe Plus Pack ..... 109.

6156 Adobe Plus Pack/ATM ..... 159.

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6985 Adobe ATM/TypeAlign Pack ..... 89.

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5001 StreamLine 1.2 ..... 225.

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3980 Digital Darkroom 1.1 ..... 248.

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7693 *Informed Mini-Manager* ..... 54.

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4751 Persuasion 2.0 ..... 329.

1330 FreeHand 2.02 ..... 329.

7467 PrePrint 1.0 ..... 329.

7088 PageMaker 4.0 ..... 499.

Altsys

1194 Fontastic Plus 2.02 ..... 51.

5425 Art Importer 2.0 ..... 75.

6499 Metamorphosis 1.5 ..... 75.

1195 Fontographer 3.1 ..... 249.

★Baseline Publishing ... 30 day MBG

7784 MacCheese 1.05 ..... 57.

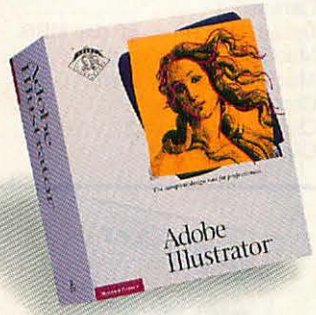
Bright Star Technology

6093 interFACE 1.0 ..... 249.

Broderbund Software

1427 The Print Shop 1.3.1 ..... 35.

6281 TypeStyler 1.5 ..... 115.



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4815 Smart Form Designer 1.01V ..... 289.
1117 MacDraw II 1.1 *(w/ATM)* ..... 289.
4814 Claris CAD 1.0V5 ..... 579.
Computer Associates/Cricket
1668 CA-Cricket Graph 1.3.2 ..... 125.
1670 CA-Cricket Presents 2.0 ..... 319.
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6095 DeltaGraph 1.5 ..... 109.
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6365 UltraPaint 1.0 ..... 125.
1769 Canvas 2.1 ..... 189.
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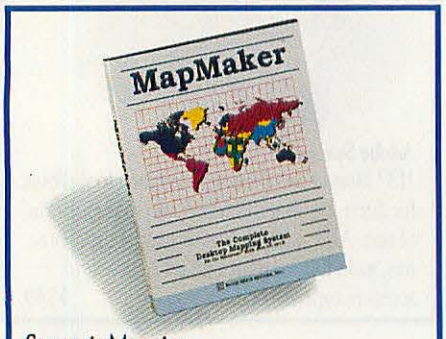
4088 MacGallery *(MacPaint)* ..... 27.
4115 MacGallery *(HyperCard)* ..... 27.
4840 Cliptures: Business 1 ..... 69.
4841 Cliptures: Business 2 ..... 69.
7684 Cliptures: Sports 3 ..... 69.



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6518 *ATLAS•MapMaker 4.5*–Publication quality color maps of your data. Includes boundaries and data for states, counties, world countries. Plots locations and data for zip-coded address files. *MacUser* 5 Mice rating ..... $369.

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6729 Comic People ..... 21.
6646 Kid Stuff ..... 21.
6728 Comic Strip Factory 1.6 ..... 37.
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4319 Generic CADD Level 1 1.1 ..... 83.
7454 Generic CADD 1.0 ..... 375.
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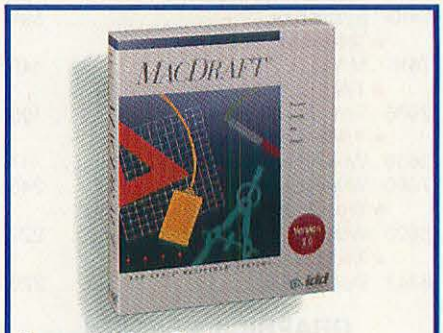
2417 MacDraft 2.0 ..... 193.
4707 Dreams 1.1 ..... 319.
Letraset
2619 ImageStudio 1.5 ..... 139.
2621 Ready Set Go! 4.5A ..... 165.
4709 LetraStudio 1.5 ..... 275.
6300 FontStudio 1.0 ..... 359.
6302 DesignStudio 1.0 ..... 489.
6301 ColorStudio 1.0 ..... 649.



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2417 *MacDraft 2.0*–Powerful precision drawing and design software for the Macintosh. Features include advanced text handling, on-line symbol libraries, layers, Bezier and spline curves, dimensioning and more ..... $193.

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6625 Clip-Art 3D *(CD-ROM)* ..... 246.
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Paracomp's 24-bit version of the best-selling 3D program, may be combined with SwivelArt, to view images in unlimited perspectives.
7441 *Swivel 3D Professional 1.0* ..... $439.
7728 *SwivelArt 1.0* ..... 82.

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7466 Process Color Imaging Guide ..... 49.
Paracomp
7421 DrawTools 1.0 ..... 62.
7728 SwivelArt 1.0 ..... 82.
4597 Swivel 3D 1.1 ..... 295.
7441 Swivel 3D Professional 1.0 ..... 439.
7839 FilmMaker 1.0 ..... 439.
★Preferred Publishers ... 30 day MBG
7828 Exposure Pro ..... 69.
Quark
7612 Quark XPress 3.0 ..... 529.
Softview
7499 if:X Forms Designer 1.0 ..... 169.
★Solutions, Inc. ... 60 day MBG
3446 The Curator 1.05 ..... 71.
★Somak Software ... 30 day MBG
7434 LaserArt CD-ROM Volume 1 ..... 62.
★Springboard ... 30 day MBG
3530 Certificate Maker 2.0 ..... 22.
4497 Top Honors 1.01 ..... 57.
4500 Springboard Publisher II 2.0 ..... 107.
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7773 Stratavision 3D ..... 369.
7772 Stratavision 3D/Renderman Bundle . 999.
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6518 ATLAS•MapMaker 4.5 ..... 369.
★SuperMac Tech. ... 60 day MBG
5625 PixelPaint Professional 1.0.1 ..... 389.
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3942 Images with Impact: Graphics 1 ... 50.
4583 Images with Impact: Business 1 ... 65.
6379 Images with Impact: Accents ..... 65.
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7115 Publish It! *Easy* 1.1 ..... 113.
5908 Publish It! 1.2 ..... 222.
★T/Maker ... 30 day MBG
6900 ClickArt Business Cartoons ..... 32.
3633 ClickArt Christian Images ..... 39.
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7424 EPS Animals & Nature ..... 82.
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6576 Vietnam Remembered *(CD-ROM)* .. 69.
6370 Quick Art *(CD-ROM)* ..... 175.
★Wildflower ... 30 day MBG
6512 SnapJot 2.0 ..... 32.
★Zedcor ... 60 day MBG
3986 DeskPaint & DeskDraw 3.0 ..... 115.

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6171 *MacPrint 1.23*–Lets you use any HP printer with your Mac. For a limited time, buy MacPrint 1.23 and get MacEnvelope 4.2, an envelope printing utility, absolutely free . . $94.

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5236 CanOpener 1.1 . . . . . 63.
★Affinity Microsystems ... 60 day MBG
1016 Tempo II 1.2.4 . . . . . 93.
7835 Tempo II Plus . . . . . 105.
★Aladdin Systems ... 30 day MBG
6169 Shortcut 1.0.2 . . . . . 46.
7504 Programmer's Assistant 1.0 . . . . . 57.
6740 StuffIt Deluxe 1.0 . . . . . 63.
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5100 SuperCard 1.5 . . . . . 199.
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7085 FileGuard Extended 2.5 *(1 user)* . . 139.
7422 FileGuard Office Pack 2.5 *(5 user)*. 349.
7423 FileGuard Office Pack 2.5 *(10 user)* 579.
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7783 INIT Manager . . . . . 35.
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5737 After Dark 2.0 . . . . . 22.
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1511 Turbo Pascal 1.1 . . . . . 68.
★Bravo ... 30 day MBG
5404 SPAMM 1.1 . . . . . 48.
★Casady & Greene ... 60 day MBG
2269 QuickDEX 1.4D . . . . . 34.
7443 A.M.E. 1.1 . . . . . 159.
7444 A.M.E. 1.1 *(5 user)* . . . . . 509.
7831 A.M.E. 1.1 *(10 user)* . . . . . 849.
★CE Software ... 60 day MBG
4689 MockPackage Plus Utilities 4.4 . . . . 31.
1727 CalendarMaker 3.0 . . . . . 31.
6278 DiskTop 4.0 . . . . . 63.
1729 QuicKeys 1.2 . . . . . 63.
7518 Alarming Events 1.0 . . . . . 85.
★Central Point ... 30 day MBG
5040 Copy II Mac 7.2 . . . . . 23.
5041 Mac Tools Deluxe 1.0 . . . . . $75.
★Connectix ... 30 day MBG
7830 Maxima . . . . . 89.
6123 Virtual 2.03 *(for SE/30, IIcx, IIx, & IIci)* 115.
6122 Virtual 2.03 *(for Mac II, incl. PMMU)* . 188.
★Dantz Development ... 30 day MBG
5255 Retrospect 1.1 . . . . . 148.
★Digitalk ... 60 day MBG
5166 SmallTalk/V Mac 1.1 . . . . . 124.
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1824 Calculator Construction Set 2.05. . . 45.
★Fifth Generation ... 30 day MBG
4287 PYRO! 4.0 *(screen saver)* . . . . . 25.
3955 Suitcase II 1.2.6 . . . . . 49.
7700 File Director 1.0 . . . . . 82.
FastBack II 2.5 or DiskLock 2.0 . . . 118.
★Foundation Publishing ... 60 day MBG
6701 HyperSpeller 1.0 . . . . . 29.
Hyperpress Publishing
4233 Icon Factory 1.0 . . . . . 45.
StepAhead or Script Library. . . *ea.* 57.

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5681 HyperTMON 1.0 . . . . . 57.
4085 TMON 2.8.4 . . . . . 86.
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★Insight Development ... 30 day MBG
6171 MacPrint 1.23 . . . . . 94.
★JAM Software ... 30 day MBG
6089 Smart Alarms w/Appt. Diary 3.0.1 . . 63.
6088 Smart Alarms 3.0 *(1-4 users)* . . . . . 125.
6087 Smart Alarms 3.0 *(5-8 users)* . . . . . 187.
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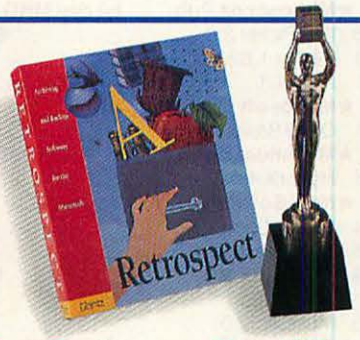
2591 The NightWatch 1.03 . . . . . 85.
6134 MacSafe II . . . . . 107.
★Kiwi Software ... 60 day MBG
6267 KiwiEnvelopes! 3.0 . . . . . 33.
7445 KiwiFinder Extender 1.0 . . . . . 65.



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5442 PictureBook 3.2 . . . . . 39.
★Magic Software ... 30 day MBG
7267 AutoSave II 1.1 . . . . . 28.
7268 POWERicons 1.0 . . . . . 39.
7270 Backmatic 1.1 . . . . . 50.
★MainStay ... 30 day MBG
7722 Marco Polo 1.0.1 . . . . . 152.
★Microcom ... 30 day MBG
4803 Virex 2.71 . . . . . 56.
5885 Virex *(10 Pack)* . . . . . 329.
7459 CarbonCopy Mac *(Single, 2 req.)* . 117.
7465 CarbonCopy Mac *(Twin Pack)* . . . . 152.
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2732 GOfer 2.0 . . . . . 45.

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6739 Prototyper 3.0 ..... 184.

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★Salient Software ... 30 day MBG
7404 DiskDoubler 3.0 ..... 45.
7403 Partner 1.01 ..... 56.

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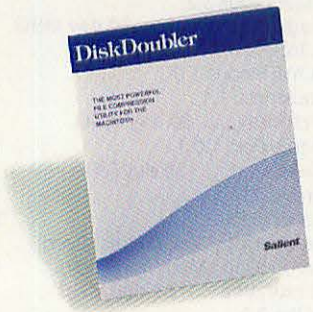
7589 Relational Objex 1.0 ..... 149.
5440 HyperHIT 2.2 ..... *special* 119.
7450 HyperHIT Relational ..... 269.



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6647 HandOff II ..... 52.

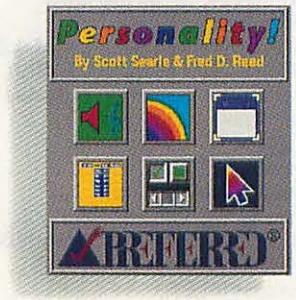
★Solutions, Inc. ... 60 day MBG
3448 SmartScrap & The Clipper 2.1 .... 45.
3449 SuperGlue II 2.01 ..... 61.

★Somak Software ... 30 day MBG
5897 ScriptEdit 2.0 ..... 62.
7430 SharpenUp 1.0 ..... 62.

★Spinnaker ... 30 day MBG
6692 PLUS 2.0 ..... 115.

★SuperMac Tech. ... 60 day MBG
3383 SuperSpool 5.0 ..... 58.
3382 SuperLaserSpool 2.02 ..... 87.
3378 SuperLaserSpool 5-Pack 2.02 ... 289.
3377 DiskFit 1.5.1 ..... 58.
3379 Network DiskFit 1.5 ..... 225.

★Symantec ... 30 day MBG
4644 Just Enough Pascal 1.0 ..... 52.
5176 Symantec AntiVirus for Mac *(SAM)* . 67.
5724 Symantec Utilities for Mac *(SUM II)* . 99.
3421 THINK Pascal 3.0 ..... 165.
3420 THINK C 4.0 ..... 165.



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6656 *Personality 1.1*–Customize the sights and sounds of your Mac. Change your menu and cursor colors, assign sounds to different Mac functions, select either Mac or 3D interface, and more ..... $49.

6748 Norton Utilities for the Mac 1.0 .... 84.

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3318 HyperDA 1.2 ..... 45.

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7147 MacEnvelope 5.0 ..... 57.
6666 MacEnvelope Plus 2.0 ..... 159.

★TGS Systems ... 30 day MBG
6667 Prograph 2.0 Compiler Version ... 245.

True BASIC, Inc.
3587 True BASIC 2.02 ..... 55.

★Wayzata Tech. ... 60 day MBG
7679 Disc Tracy Prog. Detective *(CD-ROM)* 75.

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6926 myDiskLabeler III 3.0 ..... 42.
4976 StickyBusiness 1.3 ..... 51.
6927 StickyBusiness Plus 1.3 *(bar codes)* 91.

★Zedcor ... 60 day MBG
3985 ZBasic 5.0 ..... 99.

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4486 Manhole ..... 28.
5127 Manhole *(CD-ROM)* ..... 34.
5517 Cosmic Osmo ..... 40.

Williams & Macias ... 30 day MBG
4976 *StickyBusiness 1.3*–Most comprehensive labeling program available. Hundreds of templates. Supports many brands and custom labels. $51.
6926 *myDiskLabeler III 3.0*–Imports graphics, reads disks, and prints labels in seconds ... 42.

★Aldus/Silicon Beach ... 30 day MBG
3502 Beyond Dark Castle ..... $32.
3503 Dark Castle 1.1 ..... 32.

★Ars Nova ... 30 day MBG
1215 Practica Musica 2.2 ..... 69.

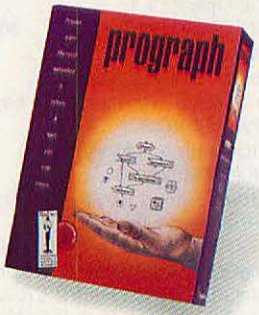
★Baseline Publishing ... 30 day MBG
7785 Talking Moose ..... 23.

★Beacon Technology ... 30 day MBG
Gems of The Word 1.0 *(KJ or NI)* *ea.* 25.
4967 HyperBible 1.0 *(King James)* .... 145.
4968 HyperBible 1.0 *(New International)* 175.

★Bogas Productions ... 60 day MBG
6135 Super Studio Session w/Music Library 99.

Bright Star Technology
3961 Talking Tiles 1.0 ..... 26.
1402 Alphabet Blocks 1.0 ..... 30.

Broderbund Software
4314 Type! 1.0 ..... 18.
4540 Ancient Art of War at Sea *(CP)* ..... 26.
6516 The Playroom *(CP)* ..... 29.
4229 Carmen Sandiego Series *(CP)* . . .ea. 29.
4966 SimCity 1.2 *(CP)* ..... 29.
5871 SimCity Supreme 1.2C ..... 47.
Geometry 1.2 *(CP)*, Physics 1.2 *(CP)*, Calculus 1.2 *(CP)* ..... *ea.* 58.
5237 Whole Earth Catalog *(CD-ROM)* ... 89.



TGS Systems ... 30 day MBG
6667 *Prograph 2.0 Compiler Version*–1989 Eddy Award winning visual programming system. Includes powerful OOP language, interface builder, and compiler. Supports toolbox and links with external C code ..... $245.

Bullseye
Ferrari *(CP)* or P51 Mustang *(CP)* *ea.* 31.

Carina Software
5726 Voyager 1.2 ..... 88.

★Casady & Greene ... 60 day MBG
2268 Crystal Quest 2.2X ..... 29.
7495 Mission Starlight ..... 29.
7498 Sky Shadow ..... 29.

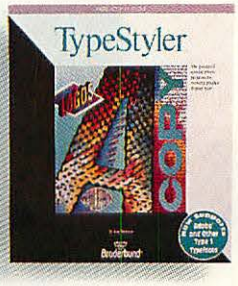
Coda Music Systems
5854 MusicProse 1.01 ..... 186.
5604 Finale 2.0 ..... 549.

Davidson & Associates
1734 Math Blaster! 1.0 *(CP)* ..... 29.
6128 Math Blaster Mystery *(CP)* ..... 29.

★Electronic Arts ... 30 day MBG
6716 Pipe Dreams ..... 17.
6663 Sands of Fire ..... 32.
6594 Starflight ..... 39.
1846 Deluxe Music Construction Set 2.5 . 84.

★First Byte ... 30 day MBG
5294 Puzzle Storybook 1.0 *(ages 3-8)* ... 27.
5293 Dinosaur Discovery Kit 1.0 *(ages 3-8)* 27.

It's plain to see.

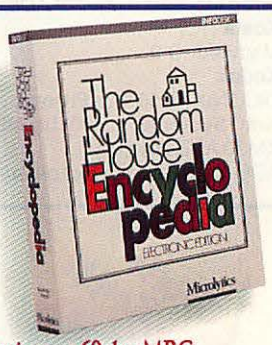


Broderbund Software
6281 *TypeStyler 1.5–Honorable Mention–1989* MacUser Editors' Choice Award for *Best Typographic Product.* "Let's you create sophisticated special effects with thousands of third-party PostScript fonts" ..... $115.

★Great Wave ... 30 day MBG
KidsTime 1.2, American Discovery 2.3, NumberMaze 1.1, KidsMath 1.1. *ea.* 26.
2271 ConcertWare+ MIDI 5.1 ..... 98.

★Highlighted Data ... 30 day MBG
7771 Webster's Dictionary *(CD-ROM)* .. 159.

★HyperGlot ... 30 day MBG
Word Torture - Beginner to Advanced *(Span., Fren., Germ., Ital. & Rus.)* *ea.* 29.
Pronunciation Tutor - Beginner *(Spanish, French, German)* ... *ea.* 35.
Verb Tutor - Intermediate *(Spanish, French, German)* ... *ea.* 42.
7472 Russian Noun Tutor *(w/sound)* .... 59.
6611 Kanjimaster - Beg. *(Japanese)*.... 105.
7473 Learn to Speak French *(CD-ROM)*. 175.
7829 Learn to Speak Spanish *(CD-ROM)* 175.



Microlytics ... 60 day MBG
7820 *Random House Encyclopedia*–Software version of the popular encyclopedia. Access other reference works, such as Microlytics Inside Information, from within this program. Disk based–no CD-ROM drive required. $68.

Individual Software
7425 Training for Microsoft Word 4.0 ... $35.
4990 Training for PageMaker 3.0 ..... 35.

★Inline Design ... 30 day MBG
5870 Bomber 1.3 *(includes headphones)* 32.
7622 Darwin's Dilemma..... 32.

★Learning Company ... 30 day MBG
2670 Reader Rabbit 2.2 *(CP) (ages 4-7)*.. 30.
5453 Talking Math Rabbit 1.0 *(ages 4-7)* . 30.

★Microsoft ... 30 day MBG
2868 Flight Simulator *(CP)*..... 32.

Miles Computing
5253 The Puzzle Gallery ..... 26.
2765 Fool's Errand ..... 32.

Mindscape
4083 Balance of Power 1990 *(CP)* ..... 29.
4596 Deja Vu II *(CP)* ..... 29.

★Penton Overseas ... 30 day MBG
VocabuLearn/ce Levels I & II *(French, Italian, Spanish, German, Russian, Hebrew, & Japanese)*. *ea.* 35.

★Personal Training Sys. ... 60 day MBG
MacConnection carries the entire line of PTS modules for Excel 2.2, HyperCard, Word 4.0, Persuasion 2.0, PageMaker 4.0, Illustrator 88, FileMaker II, FreeHand 2.02, and the Macintosh ..... *ea.* 52.

Postcraft
6466 Citadel ..... 26.

Premier Technology
5773 Strategic Conquest Plus 2.0 ..... 34.
5774 NetTrek—The Real Version 2.3 .... 34.

★Shodan ... 30 day MBG
7689 Leprechaun ..... 29.

Sierra On-Line
3397 Leisure Suit Larry *(CP)* ..... 23.
Manhunter: San Fran. or NY *(CP)* *ea.* 28.

★Softstream Int'l., Inc. ... 30 day MBG
4071 Mac•Man..... 23.
4073 Colour Billiards..... 38.

★Software Toolworks ... 30 day MBG
1842 Chessmaster 2100 1.1 ..... 32.
4619 Mavis Beacon Typing 1.3 *(CP)* .... 32.
4588 Life & Death *(CP)* ..... 32.
6111 Cribbage King-Gin King ..... 39.

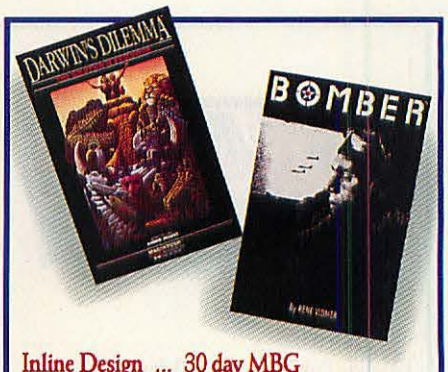
★Spectrum Holobyte ... 30 day MBG
Tetris 1.1 or Welltris 1.1..... *ea.* 19.
3459 Falcon 2.2 ..... 30.

★Spinnaker ... 30 day MBG
2328 Sargon IV *(CP)* ..... 28.

★Toyogo ... 30 day MBG
7615 Nemesis Joseki's Genius 4.7 ..... 26.
7625 Nemesis Tactical Wizard 4.7 ..... 31.
7836 Nemesis Go Junior ..... 19.
7624 Nemesis Go Master 4.7..... 41.
7623 Nemesis Go Master Deluxe 4.7.... 88.

★Wayzata Tech. ... 60 day MBG
6369 The World Factbook 1989 *(CD-ROM)* 69.
7678 USA Factbook *(CD-ROM)*..... 75.
7374 Sport News Baseball Stats *(CD-ROM)* 139.

★XOR ... 30 day MBG
6152 TaskMaker *(CP)*..... 27.
6040 MacGolf Classic *(CP)* ..... 52.



Inline Design ... 30 day MBG
7622 *Darwin's Dilemma*–Frustrating fun in full color! Climb the evolutionary tree by pushing and merging gorgeous life-form icons in this addictive puzzle game ..... $32.
5870 *Bomber 1.3 (includes headphones)* ..... 32.

NETWORKS & COMMUNICATIONS

★Abaton ... 30 day MBG
6266 InterFax 24/96 Modem ..... 418.

★CE Software ... 60 day MBG
5638 In/Out *(10 user)*..... 187.
5173 QuickMail 2.2 *(10 user)* ..... 315.

★CompuServe ... 60 day MBG
1676 CompuServe Information Service .. 23.
1673 CompuServe Navigator 3.0 ..... 49.
1674 Standard Service/Navigator Bundle 69.

Connect, Inc.
5834 Connect 1.5 for the Macintosh .... 63.

★DataViz ... 60 day MBG
1823 MacLink Plus/PC 4.5..... 117.
4842 MacLink Plus/Translators 4.5 ..... 98.

Dow Jones ... 30 day MBG
5295 *News/Retrieval Membership Package*–Allows off-line set up of personalized reports to retrieve and analyze key data from Dow Jones News/Retrieval's 55+ databases. Includes five free hours of connect time ..... $24.

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7784 *MacCheese 1.05*–First affordable 32-bit color or gray-scale paint program ..... $57.
7783 *INIT Manager*–Locate, reorder, manage and analyze all your start-up documents... 35.
7785 *Talking Moose*–Humorware for the Mac 23.

★Dove Computer ... 60 day MBG
6758 DoveFax Desktop ..... 279.
FastNet III, SE, or SE/30 ..... *ea.* 375.

★Dow Jones ... 30 day MBG
5295 News/Retrieval Membership Package 24.
1785 Desktop Express 1.03 ..... 94.

★Farallon Computing ... 30 day MBG
5707 Timbuktu 3.1 ..... 95.
4867 Timbuktu 3.1 30-Pack ..... 1285.
4866 Timbuktu/Remote 2.0 ..... 123.
6371 Timbuktu/Remote Access Pack .. 845.
2202 PhoneNET to LocalTalk Adapter ..... 8.
5664 PhoneNET StarConnector ..... 17.
6273 PhoneNET StarConnector 10-Pack . 129.
2203 PhoneNET Connector *(DIN-8)* ..... 31.
4869 PhoneNET Connector 10-Pk *(DIN-8)* 198.
2204 PhoneNET Connector *(DB-9)* ..... 31.
5251 PhoneNET CheckNET ..... 64.
2206 PhoneNET StarController 300 ..... 825.
6687 PhoneNET StarController-EN .... 1599.
5893 Portable Pack ..... 329.
6778 Remote/Wakeup Cable ..... 33.
6766 MediaTracks ..... 189.
6767 MediaTracks Multimedia CD Pack . 319.
6768 MediaTracks Multimedia Pack .... 319.

★Freesoft ... 60 day MBG
6115 White Knight 11 ..... 85.

Hayes
2300 Smartcom II 3.1C ..... 84.
2307 Smartmodem 2400 ..... 349.
6655 V2400 Baud Modem ..... 469.
5991 V9600 Baud Modem ..... 719.

Insignia Solutions
7557 Access PC 1.0 ..... 82.
7058 SoftPC-AT/EGA Module ..... 125.
4089 SoftPC 1.3 ..... 245.
6688 SoftPC for the Mac Portable ..... 245.

Intel Corporation
5119 2400EX Modem ..... 179.
6265 2400EX with QuickLink II ..... 195.
6420 2400EX MNP Modem ..... 229.
6650 2400EX MNP with QuickLink II ... 249.

★Microsoft ... 30 day MBG
5858 Microsoft Mail 2.0 Workstation ..... 83.
5856 Microsoft Mail 2.0 Server ..... 245.

★Nuvotech ... 60 day MBG
3000 TurboNet ST *(DIN-8)* ..... 30.
6751 TurboNet ST *(12-Pack)* ..... 279.
5277 TurboBridge ..... $319.
6750 NuvoLink II ..... 275.
6272 NuvoLink SC ..... 309.

Orchid Technology
6949 OrchidFAX Modem ..... 459.

★Practical Peripherals ... 30 day MBG
3102 2400 Baud External Modem ..... 179.
5285 PM 2400SA MNP Modem ..... 209.
3089 Mac Communications Pack 1.5 .. 225.

★Shiva ... 30 day MBG
3444 NetSerial X232 ..... 275.
4347 NetBridge ..... 339.
4942 TeleBridge ..... 339.
3443 NetModem V2400 ..... 429.
6917 NetModem V.32 ..... 1429.
6519 EtherGate ..... 1629.

★Software Ventures ... 30 day MBG
3455 MicroPhone II 3.0 ..... 215.

★Solutions, Inc. ... 60 day MBG
6721 MailMaker 5 User Pack 1.1 ..... 117.
6720 FAXGATE Plus 1.1 ..... 239.

★Synergy ... 30 day MBG
6618 VersaTerm 4.1.1 ..... 88.
6619 VersaTerm-PRO 3.1.1 ..... 174.

Farallon Computing ... 30 day MBG
6766 *MediaTracks*–Lets you record Macintosh screen activities into "tapes". You can easily edit and add text, graphics, and sound to your tapes, which your audience can watch and listen to at their convenience ..... $189.

★TOPS ... 30 day MBG
4188 TOPS Teleconnector *(DIN8)* ..... 23.
4598 TOPS FlashBox ..... 118.
3723 TOPS Mac 2.1 *(limited supply)* .... 137.
3720 TOPS Flashcard ..... 155.
7057 MacPrint TOPS Network Version 1.0 165.
6264 TOPS Networking Bundle 3.0 .... 187.

★Traveling Software ... 60 day MBG
3729 LapLink Mac III Connectivity Pac .. 119.
6741 LapLink Mac III Network Pac ..... 185.

INPUT/OUTPUT

★Abaton ... 30 day MBG
7432 Scan 300/GS ..... 999.
7433 Scanner Kit w/Digital Darkroom .. 259.
7431 Scanner Kit w/ImageStudio ..... 259.

★American Power ... 30 day MBG
5895 UPS 110SE ..... 209.
6686 UPS 370ci ..... 295.

Caere
4476 OmniPage 2.1 ..... 539.
OmniSpell or OmniDraft ..... *ea.* 69.
6661 OmniProof ..... 105.

Practical Peripherals ... 30 day MBG
3089 *Mac Communications Pack 1.5*–External 2400SA Modem, cable, and top-selling communications software. Hayes compatible, auto-answer. A great value ..... $225.

★CH Products ... 30 day MBG
7343 Mach IV Plus Joystick *(Quad or ADB)* 51.
7344 Rollermouse *(ADB)* ..... 79.

★CoStar ... 30 day MBG
6090 LabelWriter ..... 185.
6067 LabelWriter Labels ..... 11.

★Datadesk ... 30 day MBG
1818 HyperDialer ..... 32.
6901 Switchboard *(modular keyboard)* . 175.
MAC-101 Keyboards ..... *ea.* 129.

GDT Softworks
7687 Mac Daisy Link ..... 59.
6256 PrintLink Collection 3.01 ..... 59.
6151 JetLink Express 2.0 ..... 89.

Hewlett-Packard
6514 HP DeskWriter Printer ..... 759.

★Kensington ... 30 day MBG
Turbo Mouse 3.0 *(Plus or ADB)* *ea.* 109.

Koala
2593 MacVision 3.0 ..... 259.

Kodak
6730 DICONIX M150 Plus Printer ..... 489.

★Kraft Systems ... 60 day MBG
7519 KM30 ADB Joystick ..... 49.
6099 ADB Trackball *(with foot pedal)* .... 79.

Freesoft ... 60 day MBG
6115 *White Knight 11*–Supports XMODEM, YMODEM, ZMODEM, Kermit, and CompuServe Error Correcting protocols. Includes Okyto 1.0, a Mac-to-Mac file transfer program, and a free subscription to GEnie . $85.

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That's AM, folks.

Software Ventures ... 30 day MBG
3455 *MicroPhone II 3.0*–New version of top-selling telecom software. Build graphic front-ends to remote services & corporate mainframes. Supports XCMDs & XFCNs, ZMODEM, icons, European languages, color & sound **$215.**

★Basic Needs ... 60 day MBG
Dust Covers . . . . . call
Hard Top Keyboards . . . . . *ea.* 15.
6682 Hard Top ImageWriter II . . . . . 16.
7413 Mac IIcx/ci Monitor Stand . . . . . 40.
7417 Cordless Mouse . . . . . 89.

★Computer Coverup ... 60 day MBG
1723 ImageWriter II Cover . . . . . 8.
1720 Mac Plus Cover. . . . . 10.
1725 Mac SE Ext. Keyboard Cover set. . . 10.

★CoStar ... 30 day MBG
7453 The Organizer Jr. . . . . 69.
6091 The Organizer. . . . . 199.

Curtis Manufacturing
6733 GFP-3 *(Glass Filter Plus-Mac Plus, SE)* 65.

★I/O Design ... 30 day MBG
2379 MacLuggage Imageware II. . . . . 49.
2381 MacLuggage Macinware SE. . . . . 75.
6129 Ultimate SE/Ext. Carrying Case . . . . 79.
Ultimate SE/Ext. Neon Case *(available in green, pink or yellow)* . . . . . *ea.* 89.

★Kensington ... 30 day MBG
2573 Tilt/Swivel *(platinum)* . . . . . 22.
4973 Power Tree 20 . . . . . 27.
2559 Apple Security Kit . . . . . 33.

Aapps ... 30 day MBG
7114 *DigiVideo Color*–NuBus board displaying real-time video in color or B&W. Features 98-channel cable ready tuner with full sound, MultiFinder compatibility, HyperCard support & DA with 24-bit screen capture option. **$639.**

2566 System Saver Mac *(platinum)* . . . . $63.
2567 System Saver Mac *(beige)* . . . . . 63.
2546 A-B Box *(DIN-8)* . . . . . 63.
4643 Mac II Stand and Cable Kit . . . . . 64.
6763 SE Radiation/Anti-Glare Filter . . . . . 52.
5064 Apple Color Monitor Polarizing Filter 63.

★MacConnection ... 60 day MBG
4623 Solid Oak Disk Case *(holds 90 disks)* 32.

★Mobius Technologies ... 60 day MBG
4470 Fanny Mac QT . . . . . 55.

★Moustrak ... 60 day MBG
Available in blue (listed) or gray.
2694 Moustrak Pad *(standard 7" x 9")* . . . 8.
2692 Moustrak Pad *(large 9" x 11")*. . . . . 9.
2693 Moustrak Pad L/F *(large 9" x 11")*. . 10.

Ribbons
3255 ImageWriter II Ribbon Black . . . . . 4.
3261 ImageWriter II Ribbon Multi-4-Color . 9.
3270 ImageWriter II Rainbow 6-Pack. . . . 20.
3260 ImageWriter LQ Black Ribbon. . . . . 17.

★Sopris Softworks ... 60 day MBG
4019 Mac SE & Ext. Keyboard Cover *(navy)* 15.
4017 ImageWriter II Cover *(navy)* . . . . . 11.
4018 LaserWriter II Series Cover *(navy)* . . 17.
4012 High Trek ImageWriter Carry Case . . 49.
4013 High Trek Mac Plus Carry Case . . . . 59.
4014 High Trek Mac SE & Ext. Kybd. Case 69.
4862 SE Protection Pak *(ext. keyboard)* . . 75.

Cutting Edge ... 30 day MBG
5456 *45 Meg Removable Drive*–Offers the convenience of removable media with the reliability of Winchester technology. Features the popular Syquest mechanism & includes 1 cartridge. **$669.**
5736 *45 Meg Removable Cartridge* . . . . . 89.

★Targus ... 60 day MBG
3618 ImageWriter II Carry Case. . . . . 45.
3617 Mac Plus/SE Carry Case. . . . . 55.
4015 Mac SE & Ext. Kybd. Carry Case . . 69.
6116 Mac IIcx Carry Case . . . . . 75.

★Tripp Lite ... 30 day MBG
6199 Isobar 4 *(surge suppressor, 4 outlets)*. 49.
6200 Isobar 6 *(surge suppressor, 6 outlets)*. 59.

STORAGE MEDIA

★Sony ... 60 day MBG
3297 3½" DS/DD Disks *(10)* . . . . . 13.
6148 3½" DS/DD Disks 3 Pak *(30)* . . . . . 30.
3298 3½" HD Disks 1.44 Meg *(10)* . . . . . 22.
6375 3½" HD Disks 3 Pak *(30)* . . . . . 56.
6659 QD2000 40 MB Data Cartridge. . . . 19.

★MAXELL ... 60 day MBG
2792 3½" DS/DD Disks *(10)* . . . . . 14.
2793 3½" HD Disks 1.44 Meg *(10)* . . . . . 27.

Abaton ... 30 day MBG
7432 *Scan 300/GS*–Flatbed scanner capable of 256 shades of true gray-scale. Mac, IBM, and NeXT compatible with optional interface kits. Compatible with most OCR packages . **$999.**

★MacConnection ... 60 day MBG
6592 44 Meg Removable Cartridge. . . . . 85.

★3M ... 60 day MBG
3943 DC2000 40 MB Data Cartridge. . . . 20.

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★Logitech ... 30 day MBG

5082 ScanMan Mac Model 32 ..... $319.

Magnavox

6693 9CM080 14" Color Monitor..... 529.

6690 14" Color Monitor with Micron Xceed for SE/30 *(640 x 480)* .... *special* 849.

6691 14" Color Monitor with Micron Xceed for Mac II *(640 x 480)* .... *special* 849.

MegaGraphics

16" 8-bit System for SE/30 or II. *ea.* 3495.

7841 16" 24-bit Color System for Mac II 5295.

19" Rival Sys. SE, SE/30, or II. . *ea.* 1269.

19" 8-bit System for SE/30 or II. *ea.* 4459.

7840 19" 24-bit Color System for Mac II 5995.

19" Gray-Scale System for SE/30 or II ..... *ea.* 2195.

★Micron ... 30 day MBG

6680 Xceed for SE/30 *(640 x 480)* ..... 349.

6673 Xceed for SE/30 *(1024 x 768)* .... 589.

7149 Xceed IIci - 128 Cache Card ..... 589.

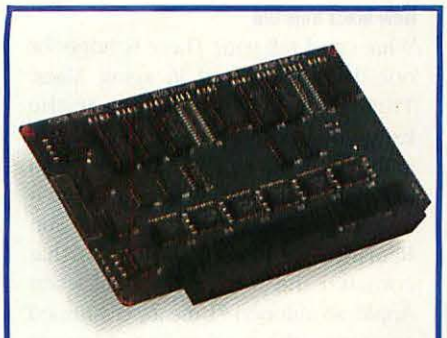
★MicroSpeed ... 30 day MBG

6620 MacTRAC..... 65.

6621 MacTRAC ADB ..... 75.

★Mouse Systems ... 30 day MBG

7520 Little Mouse ..... 75.



Micron ... 30 day MBG

7149 Xceed IIci-128 Cache Card–128K Fast Static RAM cache card for the Mac IIci, the new leader in price performance. Fully compatible with Mac software ..... $589.

★Nutmeg Systems ... 30 day MBG

6240 30/2 Interface *(SE/30 video board)* 499.

15" Monitor for SE, SE/30 or II. *ea.* 599.

19" Monitor for SE, SE/30 or II. *ea.* 995.

★Orange Micro ... 30 day MBG

3036 Grappler *(9 pin)* ..... 78.

6229 Grappler LX ..... 128.

Pacific Data Products

7412 Pacific MacPage PE ..... 459.

7411 Pacific MacPage..... 425.

RasterOps

7464 ColorBoard 208 ..... 395.

7463 ColorBoard 264 for Mac II..... 579.

7469 ColorBoard 264 for SE/30..... 689.

7457 Video ColorBoard 364 ..... 1549.

7457 RasterOps 8L ColorBoard..... 1549.

7468 ClearVue/GE System for Mac II . . 1759.

TheComplete PC

6104 Half-Page Scanner/400 ..... 295.

6103 Full-Page Scanner ..... 758.

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3648 ThunderScan Plus ThunderWorks. 199.

4994 LightningScan 400 ..... 385.

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19" Rival Monochrome System for SE, SE/30 or II–Macworld Editors' Choice in large screens. 1024 x 826 resolution with flicker-free 75 Hz refresh and perfect contrast. 19" display with tilt/swivel base; price includes interface card . **each $1269.**

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SIMMs ... 2 year warranty

1107 1 Meg SIMMs *(80ns)*..... 65.

7497 1 Meg SIMMs for Mac IIfx *(80ns)*... call

7600 4 Meg SIMMs *(80ns)* ..... call

7599 4 Meg SIMMs for Mac IIfx *(80ns)*... call

CD Technology

6983 CD-ROM Porta Drive ..... 649.

★Cutting Edge ... 30 day MBG

3989 800K External Disk Drive ..... 149.

5133 20+ Meg Hard Drive ..... 309.

3990 30+ Meg Hard Drive ..... 379.

3991 45+ Meg Hard Drive ..... 435.

5275 60+ Meg Hard Drive ..... 469.

5276 80+ Meg Hard Drive ..... 529.

5456 45 Meg Removable Drive ..... 669.

5736 45 Meg Removable Cartridge..... 89.

★Dove Computer ... 60 day MBG

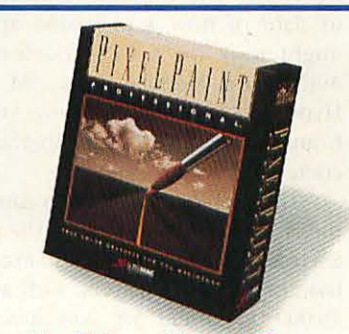
1801 SCSI Interface/Port ..... 109.

6725 MaraThon 030 for Mac II..... 449.

6724 MaraThon 030 for SE ..... 449.

6723 MaraThon 030 for Plus ..... 449.

7305 MaraThon 030 for Mac IIx..... 449.



SuperMac Tech. ... 60 day MBG

5625 PixelPaint Professional 1.0.1–Limitless colors, sophisticated effects, and an interface for creating, editing, and color separating full-color images. New 2.0 version coming soon! Buy 1.0.1 and receive a free upgrade..... $389.

1809 MacSnap 524S..... $239.

1812 MacSnap 548S..... 479.

★Kennect Tech. ... 30 day MBG

5631 Rapport ..... 195.

7588 Drive 360 ..... 249.

7590 Drive 1200 ..... 249.

5632 Drive 2.4 *(includes FastBack II)*... 325.

★Micron ... 30 day MBG

7149 Xceed IIci-128 Cache Card..... 589.

NEC

7352 Battery Pack for CDR35 ..... 59.

6744 CDR35 CD-ROM Portable Drive . . 399.

6743 Mac Driver Kit..... 64.

★Pacific Rim ... 30 day MBG

7382 Platinum 800k Drive ..... 145.

Quantum

7746 Quantum 40 Meg Int. for ci & cx ... 375.

7744 Quantum 80 Meg Int. for ci & cx ... 595.

7745 Quantum 40 Meg Int. for SE & SE/30 375.

7742 Quantum 80 Meg Int. for SE & SE/30 595.

7747 Quantum 40 Meg Int. for IIx & IIfx. . . 375.

7743 Quantum 80 Meg Int. for IIx & IIfx. . . 595.

Kennect Technology ... 30 day MBG

Drives–Owners of any Macintosh (512e-IIci) can get complete compatibility with all IBM and Apple formats by plugging one or more of Kennect's 3½" or 5¼" drives into Rapport..... **see line listing for prices.**

★SuperMac Tech. ... 30 day MBG

5447 Dataframe XP 30 Hard Drive..... 599.

5448 Dataframe XP 60 Hard Drive..... 799.

5449 Dataframe XP 100 Hard Drive... 1049.

7451 Dataframe XP 200 Hard Drive... 1399.

5451 Dataframe XP 330 Hard Drive... 2369.

Toshiba

6749 XM 3201 CD-ROM Drive..... 899.

ACCESSORIES

Apple Computer

1113 Apple ImageWriter Black Ribbon . . 10.

6717 MIDI Interface..... 84.

7748 Personal LaserWriter Toner Cart.... 89.

1114 LaserWriter Plus Toner Cartridge... 99.

1115 LaserWriter II Toner Cartridge .... 105.

★Avery ... 60 day MBG

4812 Laser Labels 1¾" x ½" *(Qty. 2000)* . . . 7.

4808 Laser Labels 4" x 1⅓" *(Qty. 1400)* . . . 24.

4807 Laser Labels 1" x 2⅝" *(Qty. 3000)* . . . 24.

4864 Disk Labels 3½" *(Qty. 250)*..... 13.

5392 Disk Labels 3½"-*Laser (Qty. 630)* . . 29.

5403 Address Labels 17/16" x 4" *(1000)* .... 9.

4865 Address Labels 3½" x 15/16" *(3750)* . 15.

4811 Transparencies 8½" x 11" *(Qty. 50)* 22.

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nouncing a product for too long—and will now find it very difficult to enter, given the prices it must charge to keep a high margin.

Mapping

We've always had some good software for mapping on the Macintosh, but now the Mac is becoming heir to the past decade's expertise in the manipulation of geographical and demographic information by computer. MapInfo, Strategic Mapping, Intermap, and Tactics International all offer products. Tactics purports to support the display of maps from a national scale all the way to the Census block level—a real achievement for the Mac if it works.

Compact Discs

The Expo was the most important event to date for CD ROM technology. There are fonts, databases, scientific and technical libraries, references, games, and other products coming out for the Mac. Unfortunately, many of the most encouraging products are awaiting the release of HyperCard 2.0. Aries and Silver Platter now offer large libraries of scientific and medical information. Passport has a neat new CD ROM of music. Those of you with children, run—don't walk—to the phone and order a CD ROM drive and Discis's new collection of children's stories, which are whimsical, fun, and entertaining. Multi-Ad Services has added a font collection of 1400 faces to its CD ROM. Image Club has added much new PostScript clip art to a CD ROM. And once HyperCard 2.0 is out, you'll be able to order a demonstration disk from *Macworld* with the best example to date of how a magazine article might look on a CD, courtesy of Authorware, Meridian Data, 3M, and Hyperpress. (Award-winning stacks from *Macworld*'s 1989 SuperStacks contest will also be featured.)

The problems with CD to date are the lack of price-competitive CD players (only Apple has much of an installed base of CD ROM players, with about 15,000 units) and the slow speed of CD technology. In the end, I think, erasable mechanisms will replace CD technology, but the important thing now is that publishers are putting information on disks and preparing for the future.

Networking and Telecommunications

Ethernet is the byword of all companies whose networks are bogging down. Asanté, Cabletron Systems, Nuvotech, Farallon, NRC, Shiva, and many other vendors all offer Ethernet connectivity, which multiplies network communication speeds by a factor of three or four. As the manager of a large network of CPUs here at *Macworld*, I'm especially interested in network-analysis products that allow us to examine network traffic. Most existing analysis tools are for Ethernet (from companies such as Neon and NRC), but Farallon has updated TrafficWatch II for AppleTalk networks.

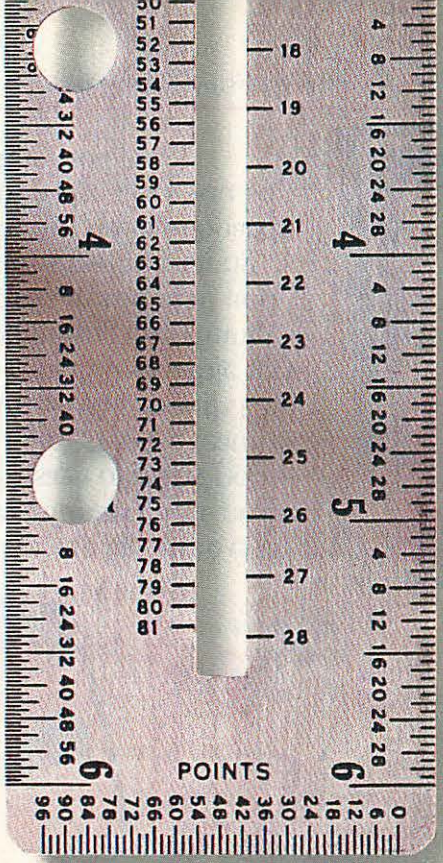
And here's a quick aside about telecommunications: CompuServe showed a new interface that was much better than the confusing old wander-and-learn interface. It's worth a look.

New Macs from Old

What can I tell you? There is hope for our dollars invested in aging Macs. There was cheap memory at the Expo—$45 per megabyte from Benchmark Labs. You can add a 68030 to an old Mac for as little as $450, turning it into a speed demon. Remember Sun Remarketing, that little company that cornered the market on Lisas when Apple abandoned (I mean, continued to support the product line as long as there was consumer demand for) the Lisa? Well, Sun has just turned a corner. It has, for the first time, more Plus and SE computers than it has Lisas. Which probably tells you something else, too, but it does mean that a real market is developing for old Macs that can be refurbished and upgraded to run current software.

So?

Altogether it was very strange. In a summer with new Schwarzenegger and Bruce Willis films, we walked around the show with visions of Abrams tanks being loaded onto transport planes destined for Saudi Arabia. I could swear I saw Salman Rushdie selling utility products in one booth. So many products and so little time to understand them and put them into some perspective. Bottom line: The Mac is going to be an exciting computer to use for some time to come. ■



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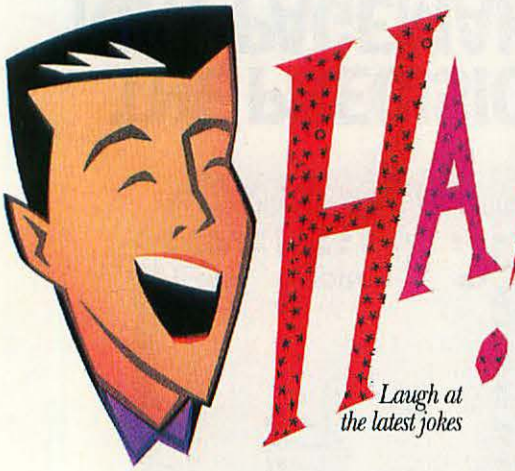

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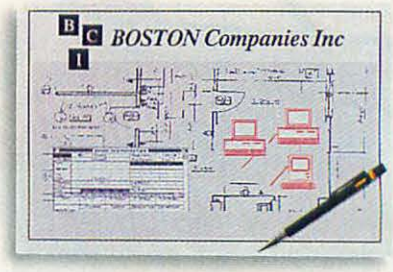

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LETTERS

Moscow on the Mac

It is safe to say that *Moscow Magazine* would not exist without its Macintosh and its subscription to *Macworld*. While it's not unusual for a slick, four-color magazine to be produced on a computer, we think the fact that this takes place in the Soviet Union is cause for some celebration.

The result of a joint venture between the Dutch publisher VNU and the Union of Soviet Journalists, this monthly city magazine acts as a bridge between Westerners and Soviets interested in developing business, cultural, and social opportunities. It is politically neutral and independent. As soon as each issue is laid out on the Mac, our art director takes the disks to our printing facility in the Netherlands.

A steady stream of curious Soviets has made our Macintosh a tourist attraction. We hope it is just a matter of time before desktop publishing is booming in the Soviet Union. Until then, we gratefully acknowledge the assistance of the Mac and *Macworld* in making *Moscow* a very hot publication.

Sarah Reetz
New York correspondent
Moscow Magazine
Moscow, USSR

Jasmine Is Alive and Well

Best Buys in Low-Capacity Drives" in your September issue contains, to paraphrase Mark Twain, a premature announcement of the death of our company (a rare mistake in your well-edited magazine). Jasmine Technologies never stopped functioning. Briefly in Chapter 11 because of a cash-flow problem, it became a division of Chess SA, and with capital help from its new parent company, came out of Chapter 11 on July 18, 1990. *Macworld*'s Deborah Branscum attended the hearing.

A full-page color advertisement for Jasmine 40MB and 180MB drives, all shipped with SUM II and a two-year warranty, appeared in the same September issue of *Macworld*. Several readers who called our 800 number asked which was correct, the ad or the article? One responded to his own question, "Well, you answered the phone—you must exist!"

Yes, we exist, and we are making drives that are even better than our previous award-winning models. We wish our 40MB drive had been tested by Macworld Labs along with the others. Its speed rates among those at the top of the list. Therefore, with its packaged software, quiet operation, reliability, warranty and low cost, it is a "best buy."

Nathan Schulhof
Senior Director
Sales & Marketing
Jasmine Technologies
San Francisco, California

We apologize for the error. Jasmine was in Chapter 11 at the time the article was being written but has since come out of Chapter 11 and is now fully operational.—Ed.

Corrections

InBox and InBox Plus (by Sitka, formerly TOPS) allow any network-addressable volume—not just TOPS file servers—to act as a server ("E-Mail: A Postal Inspection," June 1990).

White Knight II, by The FreeSoft Company, does support Ymodem ("Calling Information," June 1990).

Graphisoft, maker of ArchiCAD, is a Hungarian company; Gimeor, maker of Architrion, is a French company. ArchiCAD has documented a 40 percent share, in units shipped, of the high-end AEC CAD Mac market in Europe.

FileShare is a registered trademark of Saros Corporation ("File Services," August 1990).

The tables "Macintosh SE Results" and "Macintosh II Results" ("Best Buys in Low-Capacity Drives," Sep-
(continues)

With a Lot of Help from CAST

Although we're pleased that you're spreading the word on the power of the Macintosh for people with disabilities ["With A Little Help from My Mac," September 1990], we were dismayed by your omission of the Center for Applied Special Technology (CAST) from the "Finding Resources" sidebar. As parents of children whom CAST has served, we want to make sure your readers know how to find it (39
(continues)

tember 1990) should have shown the La Cie Cirrus with a Quantum mechanism to be faster than the Conner-based Cirrus.

*The phone number for TSG, maker of CFM/Pro (listed incorrectly as CGM/Pro) is 617/497-1111 (*New Products, *September 1990).*

The photographs on page 172 of "Prepress Progress Report" (October 1990) should have included the following credit line: E. Masterson and H. Armstrong Roberts, Inc.

The name of SoftView's forms-design package is If:x Forms Designer (New Products, September 1990).

*For information on disabling the PostScript Trojan horse (*MacBulletin, *October 1990), fax Kathleen Tinkel (203/454-4962) at MacPrePress, not Laser Letter.*

Cross St., Peabody, MA 01960, 508/531-8555).

CAST is staffed by teachers and clinicians who are also Macintosh and HyperCard experts. They do everything from clinical evaluations to custom-designing Macintosh tools for children whose disabilities range from physical (such as cerebral palsy) to learning (such as dyslexia).

Most important, CAST staff are dedicated, thorough, and caring. This kind of expertise is rare, and we believe more people should have access to it.

Kathy Huggins and Gail Nellson
via AppleLink

More Light on After Dark

I wish to correct some errors in your review of our product, After Dark (*Reviews,* July 1990). In your features list, "Screen Savers Compared," you indicated that Pyro has an animated desktop (it does not) and that After Dark does not have autocycling (it does). We released six new modules last April, among them Randomizer, which allows users to select sequential or random order, as well as how often they want the display to change. All the modules are available through the Berkeley Systems office and online services, along with many third-party modules, including an After Dark version of Moire.

Nicholas Rush
Berkeley Systems
Berkeley, California

Scanner Screw-up?

While scanning (excuse the pun) the article on color scanners ["Color Scanners: Pick from a Growing Field," August 1990], I briefly compared the color pictures shown on page 157. Much to my surprise, the best-looking picture was done with low-cost desktop equipment. Could it possibly be that pictures D and E got swapped?

I cannot believe that a picture scanned on a Dai Nippon Screen scanner and color-corrected on a Scitex system (E) could look so bad.

Desktop color has come a long way, but either someone was drunk when he was operating the DS scanner and the Scitex, or the pictures got mixed up.

Bob Prichard
via fax

The scans were not mixed up. The problem did not lie with the scan-

(continues)

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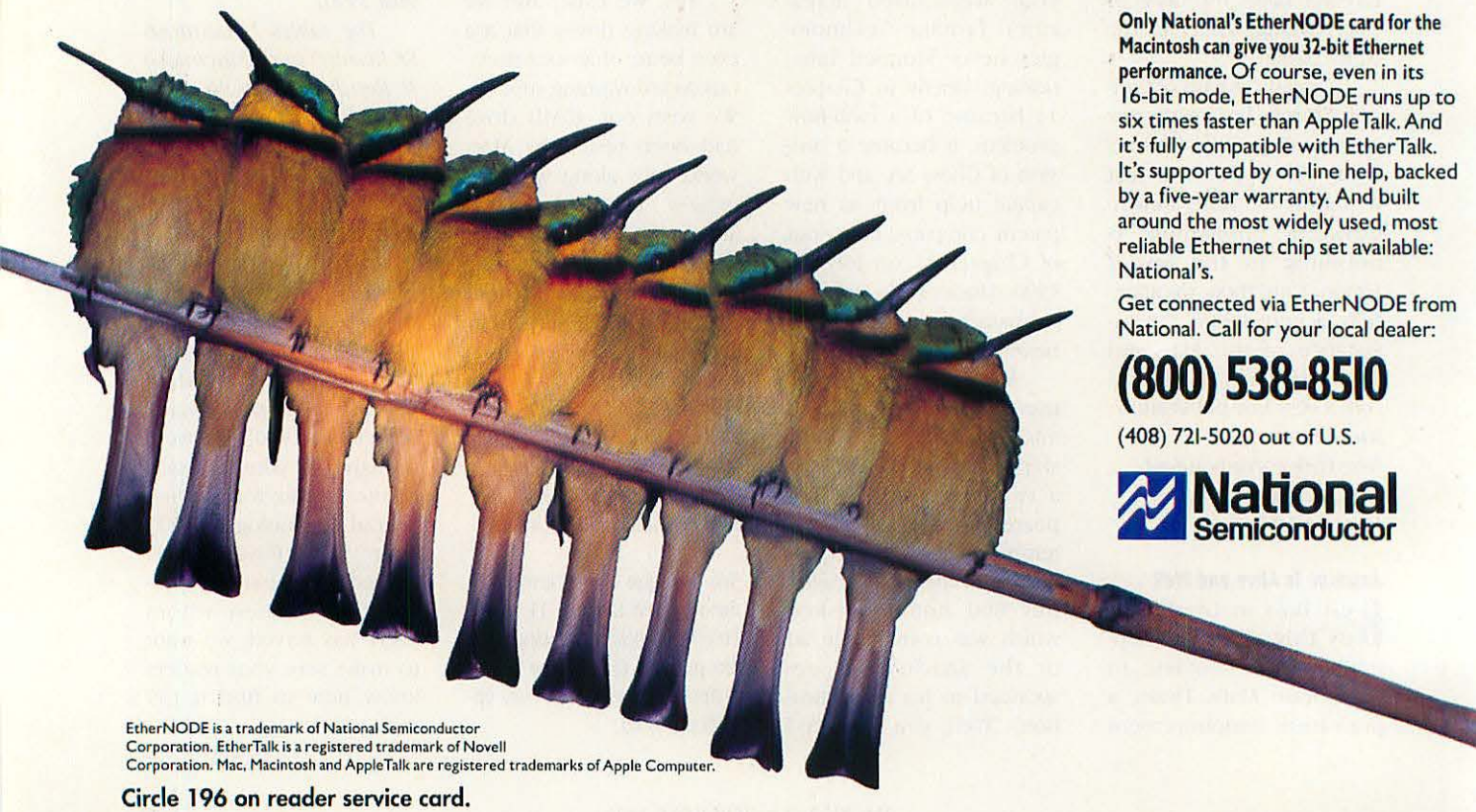

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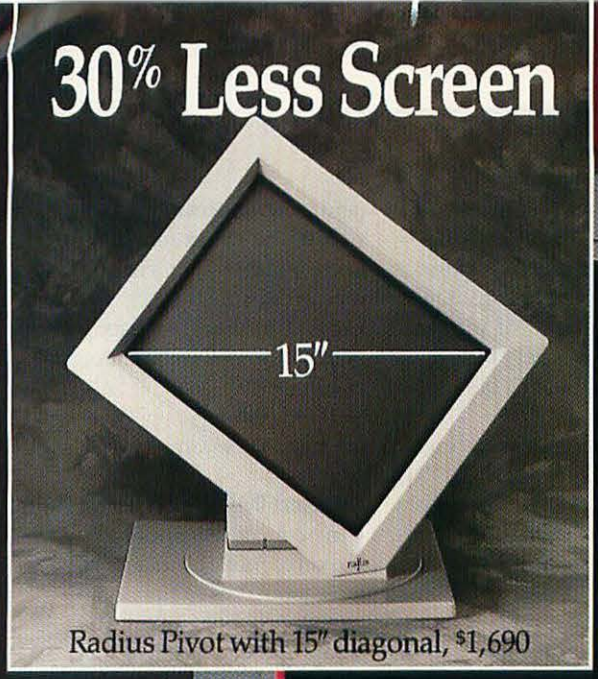
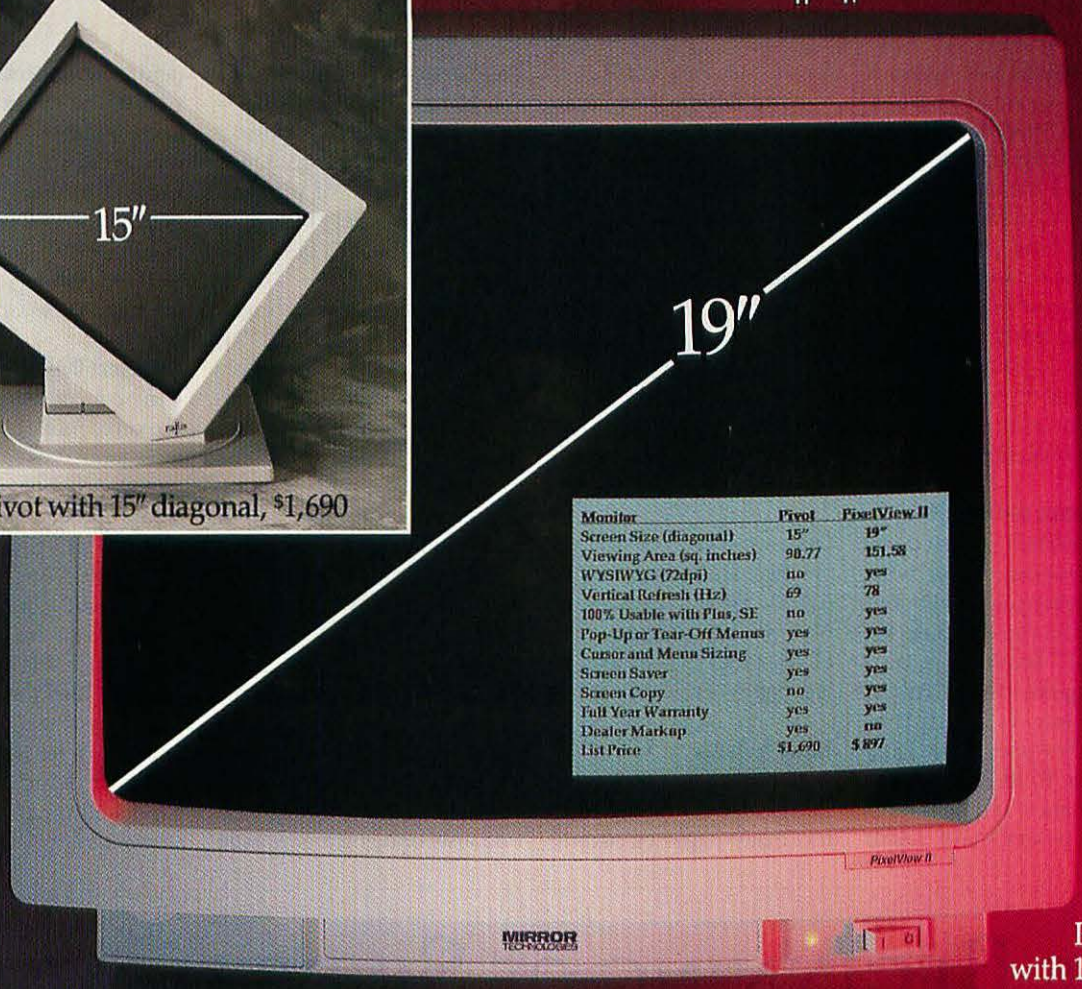


Radius Pivot with 15" diagonal, $1,690



Monitor	Pivot	PixelView II
Screen Size (diagonal)	15"	19"
Viewing Area (sq. inches)	90.77	151.58
WYSIWYG (72dpi)	no	yes
Vertical Refresh (Hz)	69	78
100% Usable with Plus, SE	no	yes
Pop-Up or Tear-Off Menus	yes	yes
Cursor and Menu Sizing	yes	yes
Screen Saver	yes	yes
Screen Copy	no	yes
Full Year Warranty	yes	yes
Dealer Markup	yes	no
List Price	$1,690	$897

$897
PixelView II
with 19" diagonal

"Our PixelView II delivers more sharp, clear image for less!"

THE PIXELVIEW IS MORE DISPLAY - When our marketing department first laid eyes on the Radius Pivot, we all agreed it was one sexy design. Then, our engineers reminded us that the Radius had 1/3 less screen, yet cost nearly $800 more (they went on to calculate the cost per square inch; $6 on the PixelView versus $18 for the Pivot . . . 300% more). And, our PixelView II, they noted, is true WYSIWYG and doesn't require software that severely patches the Macintosh system just to pivot.

WORKS WITH MORE MACS - Both displays work on the Mac II and SE/30, but the PixelView II also works on the Mac Plus and SE*.

OUR 19" TAKES UP LESS DESK SPACE THAN THEIR 15" - Our engineers explained that while pivoting, the Radius requires over 20" clearance (and forget about leaning anything up against one).

$800 LESS - Our engineers summed it up, "Are we buying productivity or sexy design? What the customer really needs is a monitor with a big, bright, clear image. And the PixelView II delivers more of that for less. Much less."

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* The Pivot can operate in the portrait mode only on the Mac Plus and SE.

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ner but with the color balance of our press. Any production professional who has dealt with a web offset press should be able to appreciate our frustration. The DS/Scitex scan looked very good in chromalin color proofs, except that it came out a little too yellow. Then our press compounded the problem by adding more yellow. A variance on a single plate of color is enough to cause problems ranging from a perceived fuzziness to mismatched colors.—Ed.

Mathematica and MaraThon

I was rather startled by your repeated assertions that Mathematica does not run on the Plus ["Full Speed Ahead: 17 Accelerators Tested," August 1990]. True, it doesn't run on a 1MB Plus, but neither does it run on a 1MB Mac II, IIx, IIcx, or IIci. Mathematica requires 4MB for the II series and 2.5MB for the Mac Plus and SE.

The 20MHz Dove MaraThon 030 at $669 list ($449 discount) is a clear price/performance leader, especially for the Plus and SE, which are not fully System 7–compatible. However, the MaraThon 030 was not among your recommendations, and no reason was given for downgrading it. Why was it not more highly rated?

Alan R. Krauss
Naperville, Illinois

Oops, we blew it on that one. We didn't give the Dove MaraThon 030 the credit it deserves. The MaraThon is a solid product at an excellent price, and we highly recommend it.—Ed.

Fatter Is Better

In contrast to Edward Arnold's complaint about too many pages of advertising (*Letters*, August 1990), I welcome a fat *Macworld*—the fatter it is, the better. I view the advertising as just another source of information; certainly very biased information, but still quite useful at times.

And *Macworld*'s "excellent lineup of writers" to which Arnold refers obviously has a better chance of remaining excellent if they are well paid. (I would imagine that selling advertising pages has a positive role in compensating writers for their efforts.)

Best of all, when there is advertising that doesn't interest me, I've learned a trick to get beyond it: using my forearm, hand, and fingers, I move the offending page in a way that enables me to see its other side while simultaneously bringing a new page (and new information) into view. If the new information doesn't interest me, I simply repeat the trick (which I've named "turning the page") until I discover information that does.

Edmund Doran
Los Angeles, California

A Different Outlook on Windows

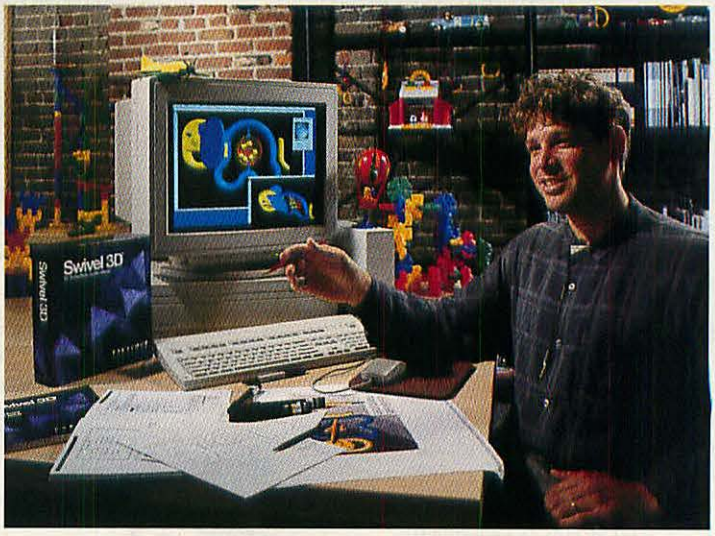
I'm concerned about the morbid outlook taken by most journalists in the popular press who lament the death of the "Macintosh difference" at the hands of Microsoft Windows 3.0. I quite frankly don't see the connection. Instead, I applaud Microsoft, its newest product, and the birth of a truly functional graphical user interface (GUI) for the PC.

What disturbs me is the supposedly expert writers

(continues)

THE BEGINNING OF SWIVELIZATION.

"With Swivel 3D, I designed an elephant-shaped rattle forDiscovery Toys. Created to help the coordination and two-handed development of infants, the initial design needed to have moving, linking parts. Swivel 3D was my tool of choice."



Swivel 3D, the award-winning 3D graphics program, helped Dan Klitsner from Klitsner design land a major project with Discovery Toys. His ideas were quickly brought to life on the Macintosh and ready for his clients to view. Using Swivel 3D, Dan built a working model of the rattle that behaved just like the final product. Convincing each department was easy– marketing understood how to sell the product, engineering saw how the parts would fit together and move, and the product development team was able to efficiently move the project along to completion. First conceived with Swivel 3D, the elephant rattle, named Tons of Fun®, became one of Discovery Toys' top-selling products.

PARACOMP® 1725 Montgomery Street, 2nd Fl., San Francisco, CA 94111
Tel: 415-956-4091 x100 Fax: 415-956-9525

Requirements: Apple Macintosh personal computers. Min. 1 meg. Swivel 3D is a trademark of Young Harvill/VPL Research, Inc. ©1990 Paracomp., Inc. All rights reserved.

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International Power Supply	yes	yes
Dual Convenience Outlets	yes	yes
Apple Endorsed External Termination	no	yes
RFI/EMI Filtering	no	yes
Extended Warranty Available	no	yes
Leasing Program	no	yes
Trade-In Program	no	yes
48 Hour Repair	no	yes
10Mb Public Software	no	yes
Password Protection	no	yes
Partitioning & Drive Spanning	no	yes
Automated Back Up Software	yes	yes
Quick Keys (5-mouse rating)	no	yes
DiskTop (4.5-mouse rating)	no	yes
10 Additional CE Products	no	yes

$400 WORTH OF SOFTWARE, INCLUDING GOLDEN GAVEL & EDDY AWARD WINNING CE SOFTWARE - Software you'll use, like CE's DiskTop and Quick Keys Light. And ten additional CE products including MockWrite, MockChart, MockTerminal, and Aask. We include Media Manager™ & VolumeBackUp™ software to password protect, partition, test, and back up your drive. And, you'll find 10Mb of shareware on each drive.

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45	367	447
90	527	597
80MP	627	697
105MP	727	797
135	727	797
180	877	897
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who appear to be under the misguided perception that a GUI was all that distinguished the Macintosh from its competition; that the addition of windows, icons, and a mouse to any other machine makes it a Macintosh clone. What is even more alarming is that the people who rely on this supposed expertise may base some extremely important decisions on this misinformation.

The Mac difference is not dead. But the difference I refer to consists of the standardization of application interfaces, a structured five-level development platform that makes the seamless integration of new printer drivers, network protocols, and system resources a comparative breeze, and yes, a rich, fully functional GUI that spans all Macintosh applications and will still operate successfully on a five-year-old 8MHz 68000-based Mac Plus.

Robin Gridley
Di-No Computers
Pasadena, California

Perception Is What Counts

It's interesting to read all the articles in Macintosh magazines proclaiming that the Mac is still superior and will be unaffected by either OS/2 or Windows 3.0. As a fellow Mac fan, I wish I could say the same thing. However, perception is reality, and the perception of the general public is that Windows 3.0 provides 90 percent of the features of a Macintosh. As a result, these uninformed people will purchase DOS machines because they're cheaper and more compatible with what most people are using. Windows 3.0 gives DOS users the primary benefits of a GUI along with the ability to run any esoteric DOS program they might need. Only the people who have a Mac and try to go back to DOS know how much easier the Mac is. Only when you use the Mac do you understand the subtle differences between Windows 3.0 and the Finder.

W. Todd Andros
Coral Gables, Florida

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Since 1986 I have been a die-hard Macintosh fan. Until a month ago I owned a Mac Plus, a 40MB Nova hard disk, and an ImageWriter II. I loved this machine, yet I recognized its limitations. After researching for months, and reading all your reviews, I decided on the Mac IIcx, a RasterOps 24-bit color board, a 14-inch NEC monitor, and the original 40MB Nova hard disk. What beautiful color! What speed! What power! What the heck happened to my files?

None of my favorite programs work. SuperPaint 1.0 either blanks out the mouse or locks up the screen. MacWrite 4.5, FullPaint, and Microsoft Works 1.0 cause a system bomb every time. PixelPaint 1.0 sends a bright yellow line across the screen when I try to use the paint can and takes five to ten minutes to lasso even a small object. I was told that upgrading the software was the answer. Well, that's a viable alternative for a Fortune 500 company, but I just paid over $5000 for my IIcx. If I bought Works, PixelPaint

(continues)

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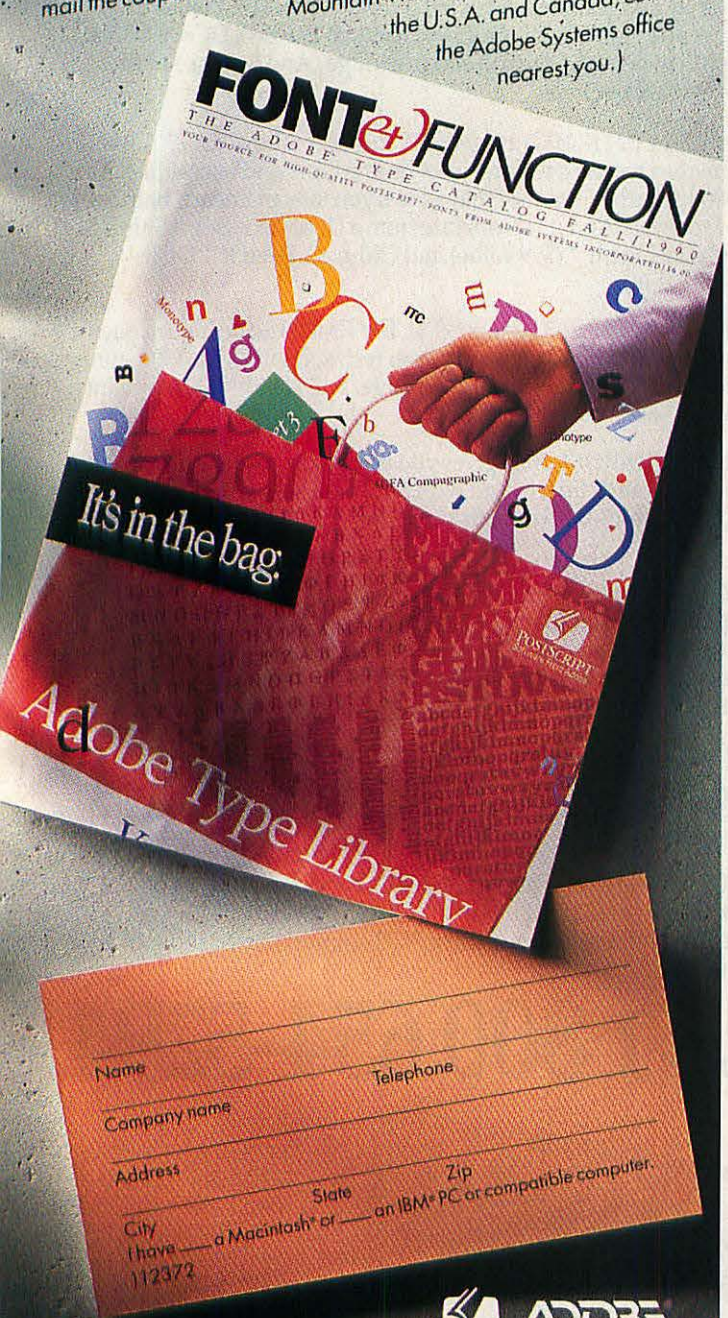

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Professional, SuperPaint, and MacWrite 5.0, I'd be another $1000 poorer.

The IIcx is a beautiful machine, but people need the facts. Warn your readers about these possible software incompatibilities—it sure would save them time and disappointment.

David Crain
Fredricksburg, Virginia

A Gray View of the SE/30

I'm the unfortunate owner of a Mac SE/30. Oh, I love the machine (despite the fact that some prude in marketing couldn't handle the correct name of SE/x), but let's face it, I've been stung. Here is a compact Mac sold under the pretext of having the new CPU and superior expansion capabilities and color, with virtually no development taking place for it. So I am left with choosing between a grand total of two 8-bit color boards costing hundreds of dollars more than their NuBus counterparts, despite the fact that they are easier to develop and material costs for their production are lower. Just as I figured I could sell my SE/30 for enough so that I could buy a IIcx without taking too much of a bath on the whole deal, Apple cut the price $1000 off what I paid for it one short year ago. Ouch! I guess that's what being on the bleeding edge of technology is all about. I'd be considerably happier with the SE/30 if Apple had just put in a 9-inch gray-scale monitor originally. Now that would have been a nice machine.

Bruce Brodnax
Irvine, California

Start a Dialog with Knowledge Index

Deborah Branscum [*Conspicuous Consumer*, June 1990] mentions that Macintosh users can access computer-related databases on the Dialog service through CompuServe. At the same time, she cautions that Dialog charges can run $1 a minute or more.

Your readers might be interested to know that they can search more than 85 Dialog databases (including 7 computer and electronics databases) on Knowledge Index, Dialog's evening and weekend service for home computer users. For a one-time initiation fee of $35, subscribers receive a user workbook and two free hours of Knowledge Index search time to be used during the first 30 days. The regular search charge is 40 cents a minute. Those wishing to subscribe to Knowledge Index can contact Dialog by calling 800/334-2564 or 415/858-3785.

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Biting Humor

It seems that Ross Scott Rubin (*Letters*, June 1990) accidentally got himself the wrong make of computer. I just don't see him as one of "the rest of us." When we reach the point where a writer (or anyone else) cannot poke fun at himself or something he's a part of, humanity is in even worse shape than most sociologists think. Under what security blanket was Rubin hiding when he characterized as "venom" the phrase "worries like a Jewish mother" uttered by someone named Levy. Jokes about their race, nationality, or religion have been bread and butter for many of our most popular comedians not only because they can do it better than anyone else, but because they can do it with impunity. I find that most people who can't laugh at themselves

(continues)

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have no difficulty laughing *at*—not *with*—others.

I do characterize as venom Rubin's phrase "he [Levy] cannot be allowed . . ." as I would characterize any attack on freedom of speech or expression. I take the time to write this because it concerns me that such tendentious carping could have a suffocating effect on good, informative, and entertaining journalism. I really think the humorless Mr. Rubin would be more comfortable with the "other" computer.

Arthur A. Volz
Old Bennington, Vermont

For the Business Minded

I thought some additional information relating to "Automating Your Small Business" [*Mac Business Tools*, May 1990] should be passed along. The sidebar on page 464 highlights templates facilitating small business automation, but our products were not mentioned. They cover accounting, invoicing, management, planning, and other needs of business users, while supporting Excel, Works, and Wingz. We can be reached at 415/794-4388.

Eric Graham
Spreadware
Hayward, California

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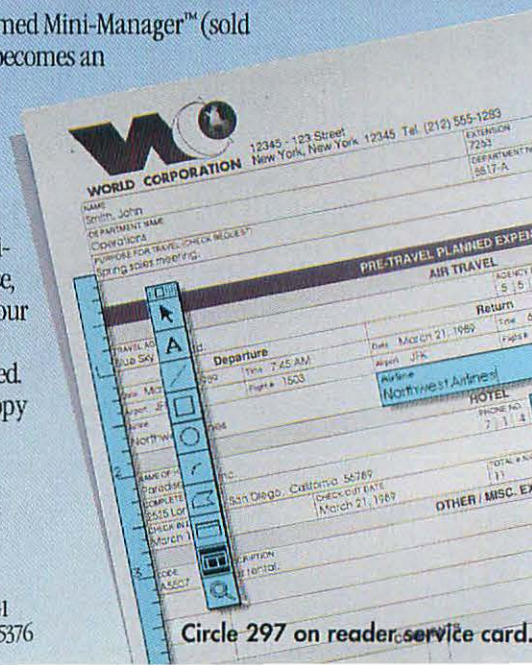

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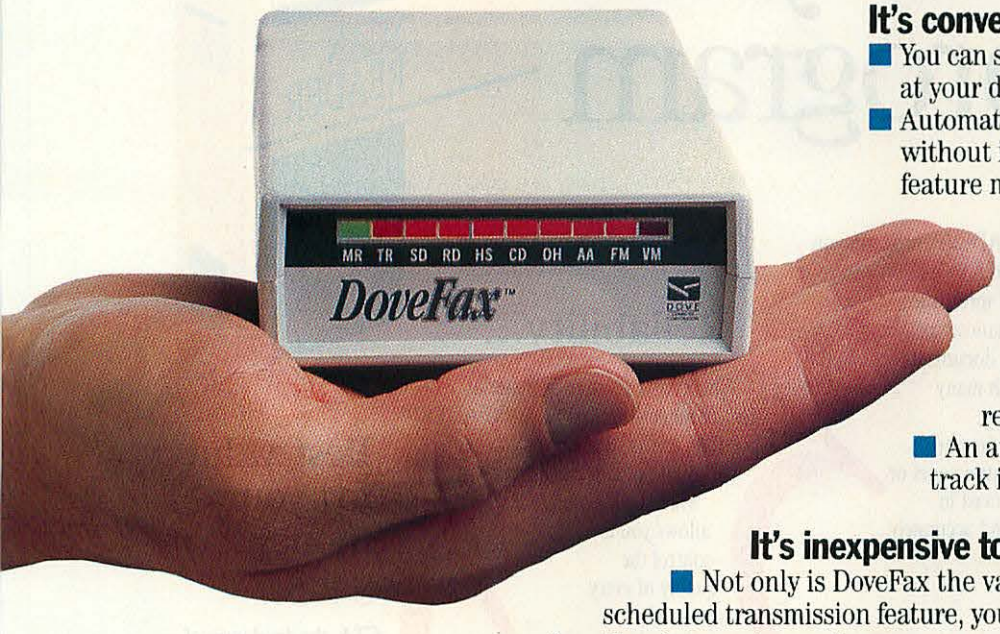

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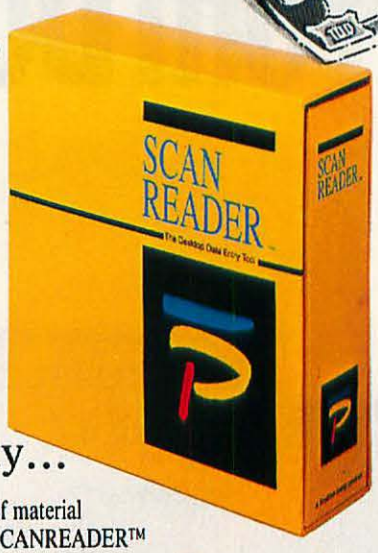

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Programs for the future

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ART BEAT

by Cathy Abes

The tools and talent behind Macworld's graphics

Artist: Mark Jasin has been a professional artist for ten years, most of that time as the editorial illustrator for the *Orange County Register*, a daily newspaper in Santa Ana, California. There he was introduced to the Macintosh about four years ago, he says, "but it wasn't until color monitors were available that I became really interested in using it." This is his first illustration for *Macworld*.

Tools: Mac IIci (8MB of RAM), 80MB internal hard disk, 19-inch SuperMac color monitor, SuperMac Spectrum/24 color board, Wacom ADB 12-by-12-inch tablet, and Aldus FreeHand 2.02.

How It Was Done: For the illustration that opens "Getting Started with Input Devices" on page 301, Jasin used FreeHand's Clone, Cut Contents, and Paste Inside commands to create interesting transparent effects with a few quick and simple steps. Because he didn't have access to a scanner, he traced the line art from his sketch into FreeHand using a Wacom tablet.

In FreeHand, he specified a white fill for all the objects (except the keyboard keys) so he could easily see which layer each object was on. To make the keys transparent so they would not cover up the graduated color he planned to use for the keyboard, he created the keys as line art without a fill, and then pasted them inside the keyboard shape.

Because FreeHand's Paste Inside command lets you place one object into another without having to

(continues)

(1) To begin, line art was traced into FreeHand. All objects were filled white except the keys, which were pasted inside the keyboard.

(2) Here both the hand and keyboard objects were given a fill—flat color for the hand and a gradation for the keyboard.

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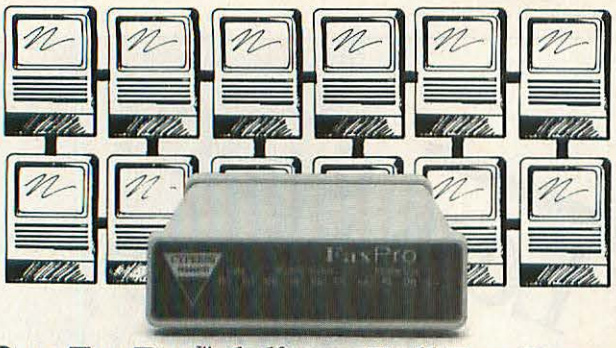

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(3) The keyboard was cloned and recolorized—from a blue-to-turquoise gradation to a flat red.

(4) The cloned keyboard pasted inside the hand object.

(5) The final illustration.

match up their shapes or sizes (since the inner object won't extend past the borders of the outer one), Jasin used it to align the keys quickly and accurately within the irregular shape of the keyboard.

To simulate an art deco style, Jasin combined flat and graduated colors in his illustration. For the keyboard he selected a gradation of blue to turquoise. "I like to use gradations to create an illusion of depth in what is obviously a 2-D design," he says. Using FreeHand, he could still change the color or gradation of the keyboard without altering the image he had previously pasted inside.

Jasin used the Clone command to place a copy of the keyboard exactly over the original. The hand overlapped the keyboard until the keyboard was cloned, at which point the cloned keyboard automatically jumped to the top layer. After using the Cut Contents command to replace the clone's blue-to-turquoise gradation with a flat red, he used the Paste Inside command to paste the recolorized keyboard into the hand object. The cloned keyboard was now on the same layer as the hand, creating an unusual visual interplay between the hand, the keys, and the keyboard, including the illusion of a red arm. But, Jasin warns, once an object is pasted inside another object, you cannot alter the color of the inside object unless you cut it from the outside one. And cutting and pasting multiple images into one object can wreak havoc with four-color separations, he adds. If an object has too many layers, you could lose a layer of color or the object might drop out entirely.

Jasin grouped the final object with all the pasted-in images so he could move it around on screen and resize it while maintaining the relative position of the pasted-in objects. ■

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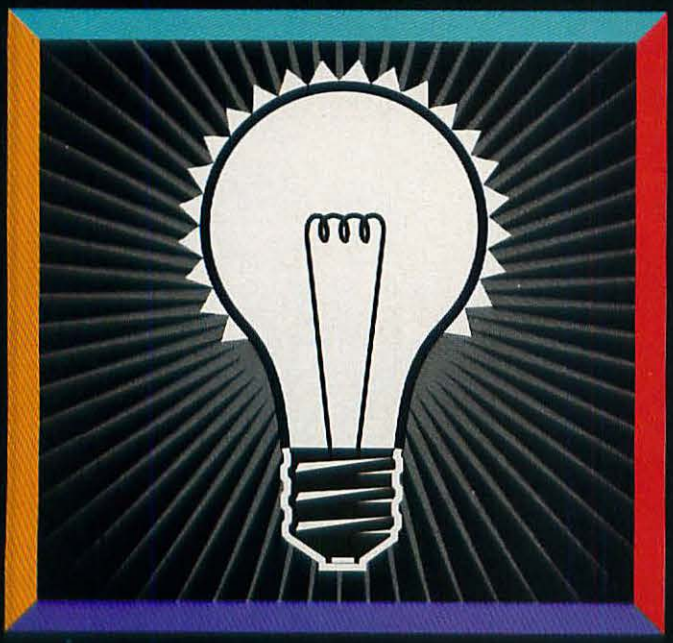

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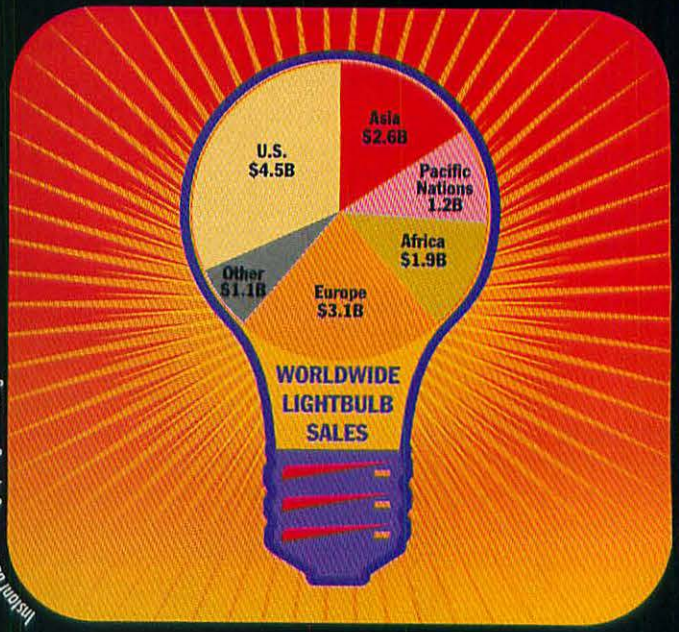

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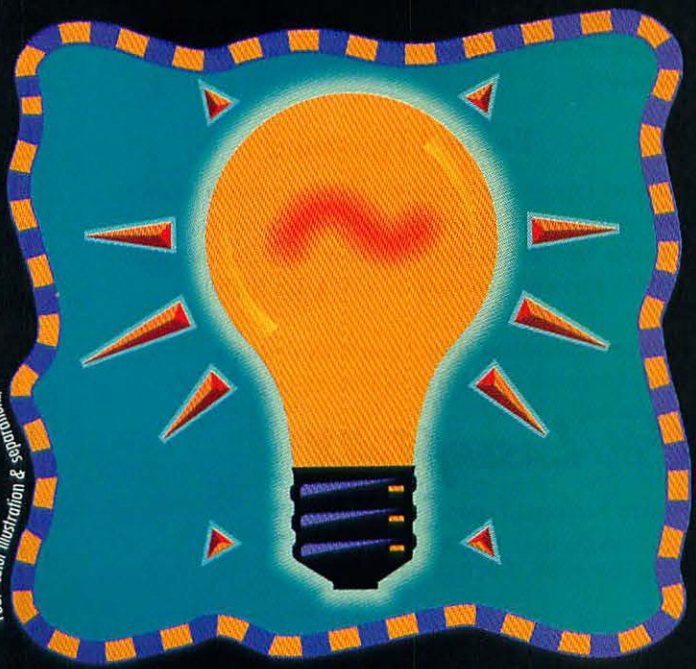

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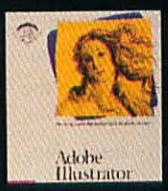

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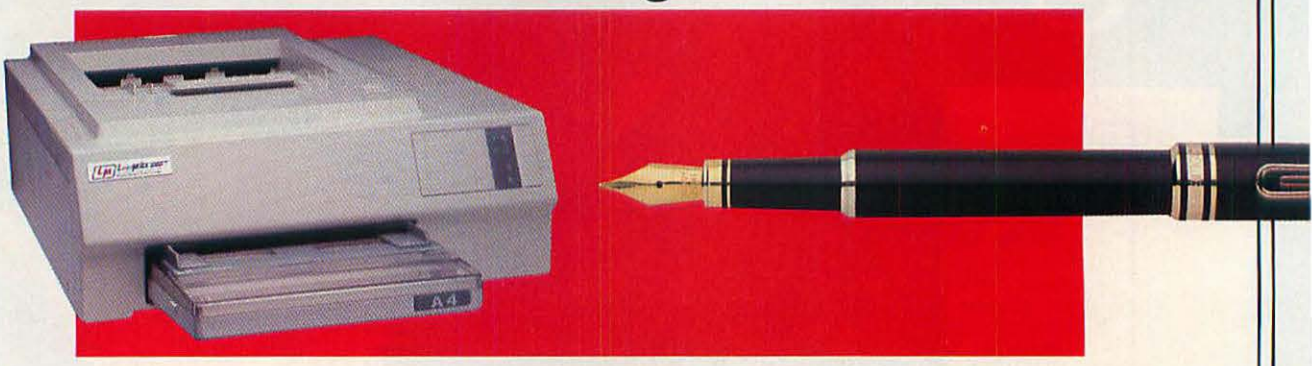

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Does the Mac Make You Stupid?

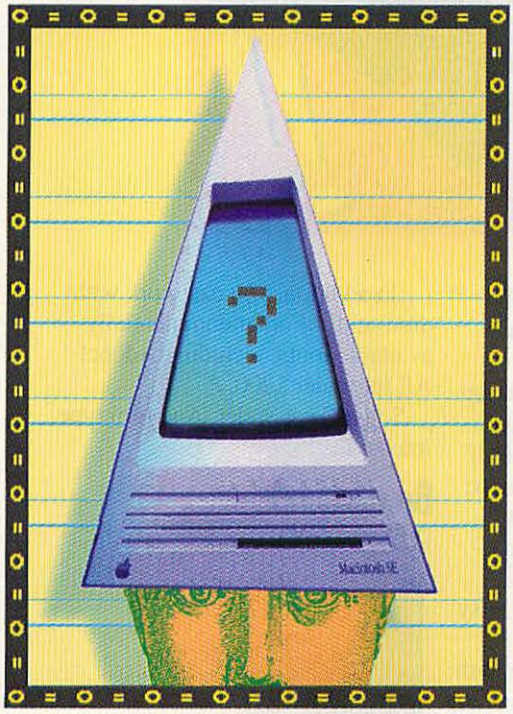
ONE WRITING TEACHER SAYS YES; HER CRITICS DISAGREE

BY STEVEN LEVY

Marcia Peoples Halio didn't mean to ignite a conflagration. She claims to have simply reported an observation, in hopes that others might be moved to test its validity. But "Student Writing: Can the Machine Maim the Message," the article she published in the January issue of *Academic Computing*, spread through the community of college composition teachers like a hair-raising electromagnetic pulse, inciting some to near-riot and even messing up a strand or two in the corporate coiffure of Apple Computer. And all Halio did was ask a question and suggest a possible answer.

Question: "Are the products produced by students writing on one machine (say Macintosh as compared to IBM) different than those written on another?" Answer: Seems that way—and essays written on the Mac are worse.

Could it be that the Macintosh—that wonderful toy that seems to boost productivity and make our lives better in every imaginable way—is actually making our work *worse?* Is it possible that what we all consider the state-of-the-art writing tool actually encourages us to butcher our prose or maim our messages? Can it be that the readily accessible graphic power of the Mac system leads otherwise-promising potential wordsmiths into a thumb-sucking fool's paradise of postliterate comma splices and italicized split infinitives? Does the Macintosh, at least when it comes to composition skills, actually make you stupid?



ERIK ADIGARD

The Delaware Effect

Apparently that's what's happening in Newark, Delaware, where Halio is assistant director of the writing program at the University of Delaware. Composition courses at that institution require all students to use the same computer to write their essays. In the spring of 1987, Halio taught a composition course in which her budding Prousts and George Wills used the Mac; previously her charges toiled in the character-based fields of IBM PCs. As she relates in the *Academic Computing* article (imagine the strains of "Theme from Jaws" playing as you read this), "I was little prepared for the surprises that lay in wait."

What had the Mac wrought? Minds laid to waste. "Never before in 12 years of teaching had I seen such a sloppy bunch of papers. Words were misspelled; commas were placed haphazardly; semicolons were virtually nonexistent . . . and such fine points as quotation marks, apostrophes, and question marks were treated with gay abandon," she wrote. The problem did not lie with syntax alone. The Mac students' vocabulary was simplistic and infested with slang. The thought was perfunctory, according to Halio. Most strikingly, even the subject matter was different. While her IBM PC–using students addressed themselves to weighty matters such as capital punishment and nuclear war, Macintosh-wielding students nattered on about fast food, dating, and the cultural significance of Styrofoam peanuts used as packing

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materials. The Delaware students, presumably tainted with Mac-ness, were churning out the essay equivalent of rock videos.

After the term ended, Halio wondered whether it had all been an aberration, one of those unexplainable phenomena like crop circles or Regis Philbin. So during the subsequent fall term, she followed up on her suspicions. Quite coincidentally, five instructors in the program at Delaware that semester each taught two sections of freshman comp. The curriculum was identical except that one class used Macs and MacWrite, the other IBM PCs and WordPerfect. As Christmas approached, Halio asked those teachers if they noticed any difference. Four out of the five instantly responded: Yes! The Mac sections are worse! (The fifth instructor also noticed a difference, but couldn't put his finger on it.)

Halio chose a few essays at random and ran them through some computerized analysis programs, noting that the Mac students wrote simpler, less sophisticated sentences than their IBM counterparts. Also, their spelling was worse.

Halio really didn't claim to know exactly why the Mac was dumbing down her kids, but she indulged in some informed speculation. The small screen size might have something to do with the simple sentences. But, she suspected that the very playfulness of the Mac, and its graphic-based philosophy, might be at the heart of the problem. "Can a technology be too easy, too playful for young, immature writers to use?" she muses. "Can such a technology arrest their writing at a less mature stage of development?" Her article finishes with a section called "Fears and Misgivings," in which she poses a series of unanswered questions and urges others to attempt to confirm or debunk her observations.

On Halio's Case

The response to the article was quick and forceful. "My husband and I were away when the article was published," Halio recalls. "So the first inkling I got of the furor was a friend who sent me printed sheets of comments on various computer networks. Some of the comments were very strong. Later the paper mail came—hundreds of letters." And what did the letters have in common? "People have an incredible emotional attachment to their computers," Halio replies. She reluctantly divulges that the attacks on her article got rather personal; ultimately it reached the point where an observer took her aside during a conference and asked, "Why do they hate you so?"

It's really not so surprising. Hundreds of writing teachers have students write essays on the Macintosh. They believe that it is a powerful tool that enhances the learning process. Is it any wonder that they stream to the ramparts when someone suggests that by their choice of tool, they are potentially damaging their students? As Burt Cummings, Apple Computer's direc-

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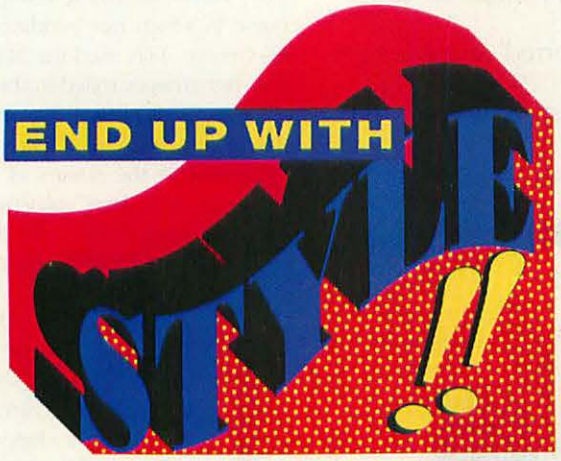

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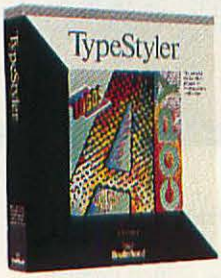

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tor of higher education marketing, notes, "People have a need to affirm what they're doing is correct."

The whole debate took on a more concrete sense of importance when writing instructors noticed that photocopies of the Halio article were being circulated within the groves of academe—and some of the recipients were officials in charge of computer purchases. Certainly it was not the intent of Halio or *Academic Computing* to tank Apple sales. "We didn't publish the article as being definitive, final research, nor did the author approach it in that fashion," insists the journal's beleaguered editor in chief Joel Kolbensvik. But—perhaps because their literary skills have been eroded by all those hours in front of a Macintosh—people kept misreading the article to conclude just that. High-circulation publications like *Business Week* (which did run a clarification later) and the *New York Times* ran brief items about the article, treating Halio's "observations" as if they were stark truth.

It's no wonder that Apple itself felt compelled to respond. "It was disappointing that people read the article as definitive," says Cummings. "We had to put out things that combated that." Apple now distributes a shiny brochure explaining how the Mac enhances college composition courses, loaded with testimonials from professionals.

Apple avoided a direct attack on Halio, but others were happy to debunk the Delaware Effect. One of the more damaging responses was a letter signed by 20 instructors participating in an online discussion called Megabyte University. Their affiliations range from Yale to UCLA to Jackson (Michigan) Community College. As with most of Halio's critics, their main complaint is that her observations were not fortified with scientific studies. "Halio's article is . . . seriously flawed by methodological and interpretive errors," it claims. As in several other papers, Halio's tentative claims are refuted point by point: the sample wasn't representative, the computer analysis proved nothing. And on and on.

Most of the complaints focus on the unscientific basis of her claims: her sample wasn't representative, there was no control group, and in general Halio didn't provide the kinds of information that would enable anyone to duplicate her findings. (Of course, Halio never claimed to be doing a scientific study.) The writers of the Megabyte letter, and other critics, also zeroed in on Halio's use of the Writer's Workbench software to document differences in the essays. "The program supplies a great deal of information about a piece of text, but none of it concerns the content or the quality of that text," the letter notes. In short, the charge is that Halio acted not only "prematurely" in rushing to publication without concrete results, but "irresponsibly" as well. So there.

Marcia Peoples Halio admits that by not performing a scientific study, she left herself open to that sort of criticism—though she says she was totally unprepared for the passion devoted to debunking her theory. But for all the heat, she is as convinced as ever that the observations are valid. She claims that other writing instructors have contacted her, almost surreptitiously, and confirmed that the Delaware Effect extends beyond the boundaries of the First State. They, too, believe the Mac makes you stupid. "What troubles me the most is that they say this to me under their breath," says Halio. She is currently performing a controlled study to find out if she can document her suspicions.

Is it possible that Marcia Peoples Halio is correct? Not even Apple can definitely say. "I have no study to prove otherwise," says Burt Cummings. But it certainly should count for something that hundreds of writing instructors have successfully used the Mac without noticing the Delaware Effect.

One of these instructors is Nancy Kaplan, a director of writing at Cornell University, a signer of the Megabyte University letter, and a coauthor of a paper debunking Halio's article. In her experience, Kaplan says, the Macintosh has proved to be an excellent choice for composition courses. She believes that its ease-of-use is important, and says she has seen no difference in the quality of essays written on the Mac compared to essays written in the courses she previously taught that used IBM PCs. She also makes use of the Mac's multiple windows for software she has cowritten to evaluate and respond to student papers. In Kaplan's

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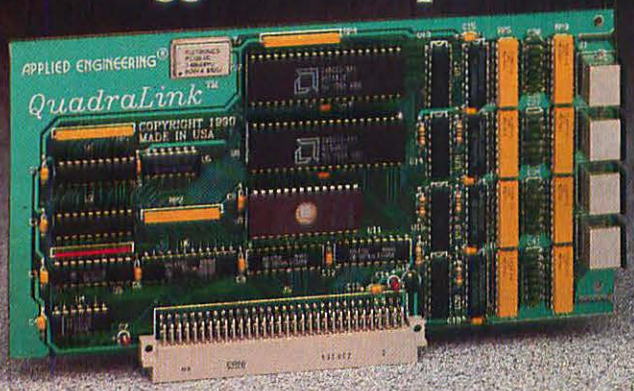
opinion, Halio simply doesn't understand the Macintosh well enough to evaluate it. Noting that Halio frequently carps on the "icon-based" graphical interface, not a big factor in word-processing software, Kaplan contends that Halio "doesn't seem to know the difference between the application and operating system." Kaplan also thinks that Halio's complaint about the frivolous choice of topics made by Mac-using students is ridiculous. "I don't share her prejudice [about trivial subject matter]," says Kaplan, who likes students to write about things they feel comfortable with. "I've never had an interesting paper on abortion yet."

Kaplan also likes some of the specific features of the Mac, features that cause Halio to think the computer might retard pure composition skills. Namely, the Macintosh's easy access to different type fonts and styles, the ability to integrate graphics with text, and even the possibility of using hypertext to venture into nonlinear modes of expression. To Halio these are distractions; to Kaplan these are advantages. Kaplan believes that in this highly visual age we live in, limiting oneself to words alone is "a kind of poverty."

Clogged serial ports?



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Gildy Consciences

And here, I believe, is the real source of the fire concerning Marcia Peoples Halio's article. Halio's ultimate complaint is that the Macintosh fast-lanes students into a pop-culture form of expression. With bitmapped displays that make use of varied typographic options and the ability to merge pictures with text, her students devote much of their energies into what papers *look like* rather than perfecting the prose. "It [is] difficult to separate text from 'gilding'," writes Halio. Her fear is that ultimately, the Mac—and other visually based computers, which will soon dominate the market—will encourage a post-literate form of communication that will neglect the traditional strengths of the essay form, which is based on logic rather than the more visceral form of persuasion provided by graphics. (I have a soft spot for this argument myself: see "The End of Literature," *The Iconoclast, Macworld* June 1990.)

In the other corner are composition-teaching professionals like Nancy Kaplan, who embrace this trend, viewing it as an opportunity to enhance their students' communicative skills. In the paper she coauthored with Stuart Moulthrop of Yale University, to be published in an upcoming issue of *Computers and Composition*, Kaplan postulates that "to restrict argument to . . . words alone may be defining 'composition' far too narrowly, especially in a world where information takes complex and sophisticated forms. . . . Literacy in the next century may well mean the ability to compose in multiple discursive dimensions and across media." Instead of worrying about excessive gilding, she and Moulthrop wax rhapsodic about the practice, noting that the word derives from "drawings embellished with gold." Those who

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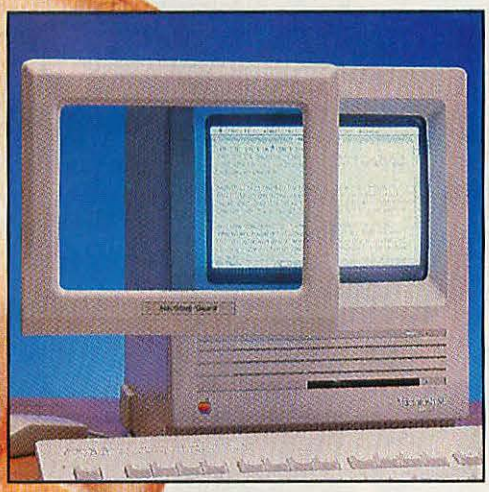

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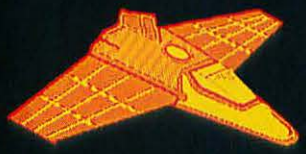

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would object to new, graphically oriented forms of writing are likened to "puritans." As an enthusiastic supporter of the more visually oriented writing to come, Kaplan is planning to teach writing courses using the tools of multimedia. This even though, as she and Moulthrop write, "in Halio's view, expanding rhetoric to include multimedia composition would distort the function of college writing courses."

I suspect that Halio is not the only educator who *thinks* that the expansion of rhetoric to graphic forms of persuasion—the stuff of Madison Avenue, actually—would be somewhat less than a boon to composition courses, especially when so few American students are capable of composing a decent paragraph of words alone.

In the end, what I extract from the Halio controversy is this: the Mac itself doesn't hurt one's writing. Instead, if a teacher doesn't set specific limits, the Mac gives students the ability to express themselves in powerful new ways, some of which reflect the sometimes slipshod, sometimes sneaky forms of persuasion that proliferate in our television-and-advertising-soaked culture. By concentrating on an essay's visual image, a student may never get around to comprehending the rigorous rules of linear thought that traditional composition courses have emphasized. But that might not matter, since literacy as we know it is an endangered species whose demise might be as unheralded as one of those thousands of extinctions in the rain forest.

My own writing experience with the Mac—overwhelmingly positive—leads me to doubt the pervasiveness of the Delaware Effect, but I do agree that Marcia Peoples Halio is onto something. She sees the new technology, and the professors that embrace it, as a threat to classical education. Moulthrop and Kaplan cut to the chase when they write that "if we English teachers are unwilling to expand our notions of writing, we relegate ourselves to the study of the past and the instruments of the past." But what if the future makes us stupid? ■

Steven Levy, a Macworld *columnist, is currently writing a book on artificial life.*

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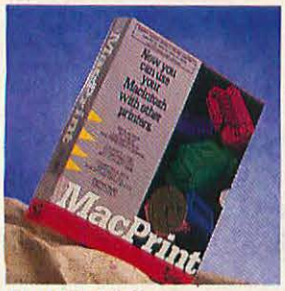

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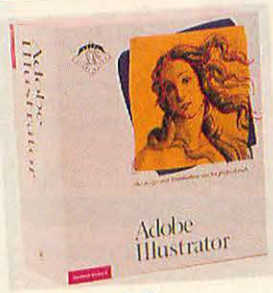

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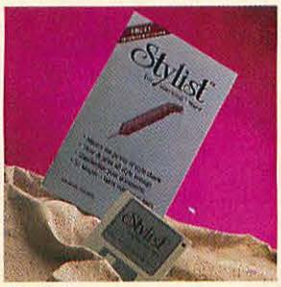

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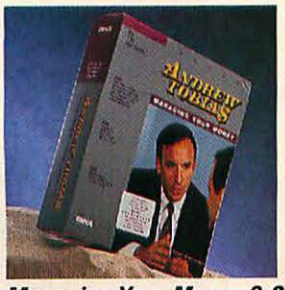

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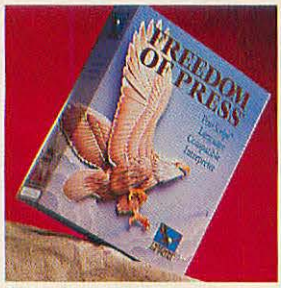

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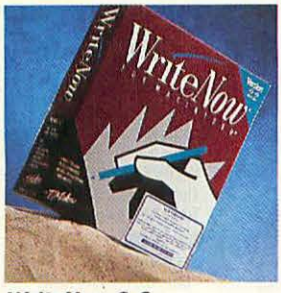

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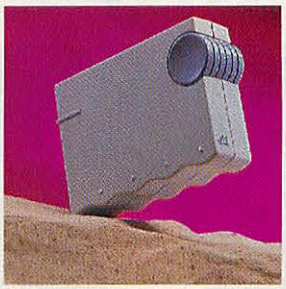

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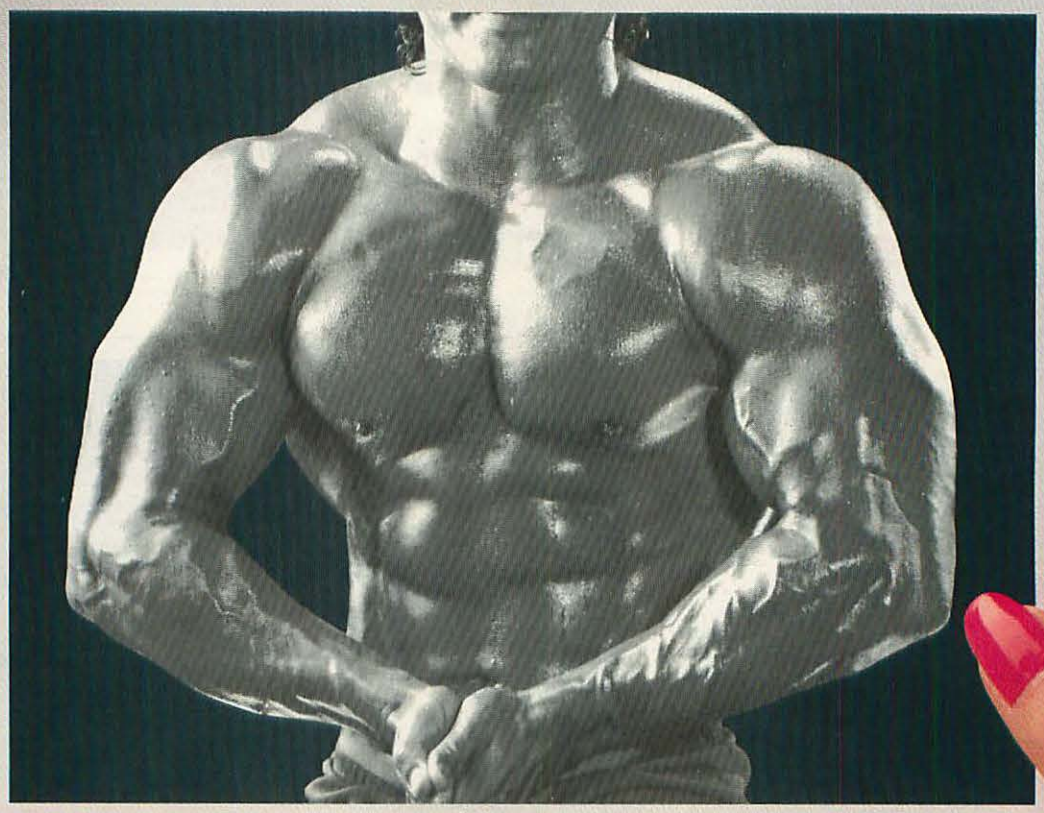

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What You Should Know About Repairs

INDEPENDENT SERVICE PROVIDERS ARE CHALLENGING APPLE DEALERS

BY DEBORAH BRANSCUM

Apple, like most companies, has had its share of quality-control and design problems. The short-lived power supplies of older Macs is one example; the noisy fans in early SEs is another. And even the best products can fail with age—floppy drives drift out of alignment, keyboards get clogged with debris. There's an easy fix during the warranty period: simply find a dealer and have the computer repaired. But once the equipment is older, there are more choices. In addition to Apple-authorized dealers, there's a growing number of independent service providers (ISPs) to consider. And tech types with a talent for soldering can find several companies that sell Mac parts and schematics for home repairs.

Most independents can charge consumers less because, unlike Apple dealers, they repair broken components. Apple service technicians are not encouraged to perform component-level repairs. Instead, they are trained to locate the component, or assembly, that failed and replace the entire unit.

"A major problem with power supplies for SEs and Mac IIs is when a simple on/off switch fails," says Larry Pina, author of *Macintosh Repair & Upgrade Secrets* (Brady Books, 1989). "Apple dealers will tell you your power supply is blown and it will cost you several hundred dollars to get it repaired." An independent, however, will charge much less to replace the switch fuse rather than the board. "If your car is broken and you get a new one, that is not repair," says Pina. His advice? Go to a shop that says "it will repair just the parts that failed and not try to sell you new computer guts."

DRAKE SOREY

An Apple employee tests a logic board for flaws at the company's repair facility in Campbell, California.

Apple's Approach Apple has a different perspective. According to Jim Briody, Apple's director of service operations, there are several good reasons why Apple discourages component-level repair. Apple will sell some parts to dealers for repair. "But there are certain assemblies where it is impractical, dangerous, or almost impossible for a service provider to diagnose and repair," says Briody. There are three basic reasons for Apple insisting that assemblies be returned to the company for repair: (1) It's the industry direction, he says, citing Hewlett-Packard as another computer company with the same policy. (2) It's necessary. "Diagnosing and troubleshooting a board is almost impossible to do on a field basis. You need sophisticated test equipment." (3) Technology. Older Macs used so-called through-hole technology. "It was fairly easy for a technician to do a through-hole board," says Briody. But new boards use surface-mount technology to place circuitry and parts on a board. "It takes special equipment at a factory to put them on; it takes even more specialized equipment to reglue them and clean the board," he says. "The new boards have become highly dense; there's no room to play."

When a consumer takes a Mac to an authorized dealer, a technician diagnoses the problem, removes the assembly that has failed (a Mac II logic board, for example), and usually replaces it with a reconditioned board. If the old board can be repaired it is

(continues)

DRAKE SOREY

MicroMat Computer Systems of Novato, California, is one of the growing number of independent service providers for Macintosh repairs. Technical director Jeff Baudin says his company repairs keyboards for $25, which includes a one-year warranty.

sent to Apple, refurbished, and then sold back to a dealer. Exchange parts are less expensive than replacement parts. If the old board can be repaired, the consumer may be charged some $600 for a replacement board and labor costs, and receives a 90-day warranty on the replacement part. The defective parts Apple receives are "put through our repair process," says Briody, who oversees Apple's Campbell, California, repair facilities. "In Campbell we take logic boards that have been produced at all different times and bring them up to the latest engineering levels." Then Apple sells the repaired boards—as well as new ones—back to dealers.

Independents Compete It's true that boards in the most sophisticated Macs use surface-mount technology and can be difficult to repair. It's also true that components in older Macs are fairly easy to fix and make up the bulk of the repair market.

"I think now we're about to cross the threshold where people say, Gee, this thing isn't as mysterious as I thought," says Richard Martin Harold, president of Shreve Systems (318/635-1121) in Shreveport, Louisiana. Shreve has been in the computer business for ten years, more recently buying and selling used Macs, but has emphasized its repair business more in the past 18 months. A common repair, such as replacing a Mac Plus analog board, would cost $75 for an exchange or $39 plus parts for a repair. Harold says his turnaround time is typically 48 to 72 hours. His company will exchange a defective 800K floppy drive for a reconditioned one for a cost of $195, but will not repair the drives. Shreve also sells schematics that range in price from $29 to $109.

One company that caters exclusively to the technically able is Pre-Owned Electronics (617/891-6851) of Waltham, Massachusetts. The company sells Apple II and Macintosh systems, parts, and repaired components. "Everything we buy is taken apart and refurbished," says vice president Charles S. Kouyoumjian.

Mike McCord of MicroDoc (503/344-5335) in Eugene, Oregon, is a veteran ISP who has made a name for himself selling to Apple dealers and other repair shops. He started out in the TV-repair business for Sony. MicroDoc has repaired Macintosh components exclusively—boards, floppy drives, keyboards, and mice—for the past three years, charging a maximum rate of $79 for repairing an analog board. That includes a one-year warranty, ground shipping, and a 24- to 48-hour turnaround time. MicroDoc also sells repair and upgrade kits to dealers and do-it-yourselfers. Even so, McCord has sympathy for Apple's repair policy, unlike many ISPs, and does not encourage consumers to pick up a soldering iron.

Harold agrees. "We run into a lot of customers who will buy a $5 soldering iron and get a screwdriver and pop open their Mac. They may start out with what could be repaired for $5 and they may end up ruining a logic board." A subtle example involves cleaning the flux, a bonding agent in the solder, off the board. "Over a period of time, depending on the component, the flux will eat into the solder connection and cause system errors," says Harold.

Larry Pina concedes that people should be careful when repairing their own Macs, but doesn't believe it's particularly difficult to do. Troubleshooting is another matter, however. "People confuse troubleshooting and repair," he says. "Repair is like popping something into the microwave. Troubleshooting is like gourmet cooking from scratch."

Avoiding Problems Repair experts say software problems are often confused with hardware problems. How can you tell? "If the problem doesn't appear when you boot off a standard System disk, maybe it's time to go back to a stripped-down system," says Pina, who points to the infinite combinations of INITs and cdevs that sometimes crash a computer. Multiple Systems and mixed Systems and Finders also create problems.

Misconnected SCSI devices can also masquerade as more serious problems. "There'll be situations where people set the SCSI address for a third-party device that's the same address as something already on the chain," says Harold. "They'll get a bomb or a system error and automatically assume they've got a defective piece of hardware. And we'll run the diagnostics and can't find a thing wrong because there is nothing wrong. And we have to charge them."

DRAKE SOREY

Jim Briody, Apple's director of service operations, says the company doesn't repair keyboards because they can't be repaired to the same quality level as new keyboards. For other refurbished components, such as logic boards, Apple provides a 90-day warranty.

Carelessness can contribute to real

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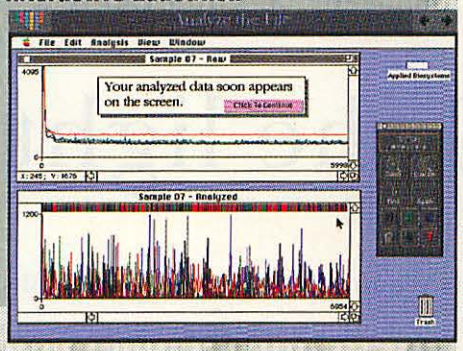

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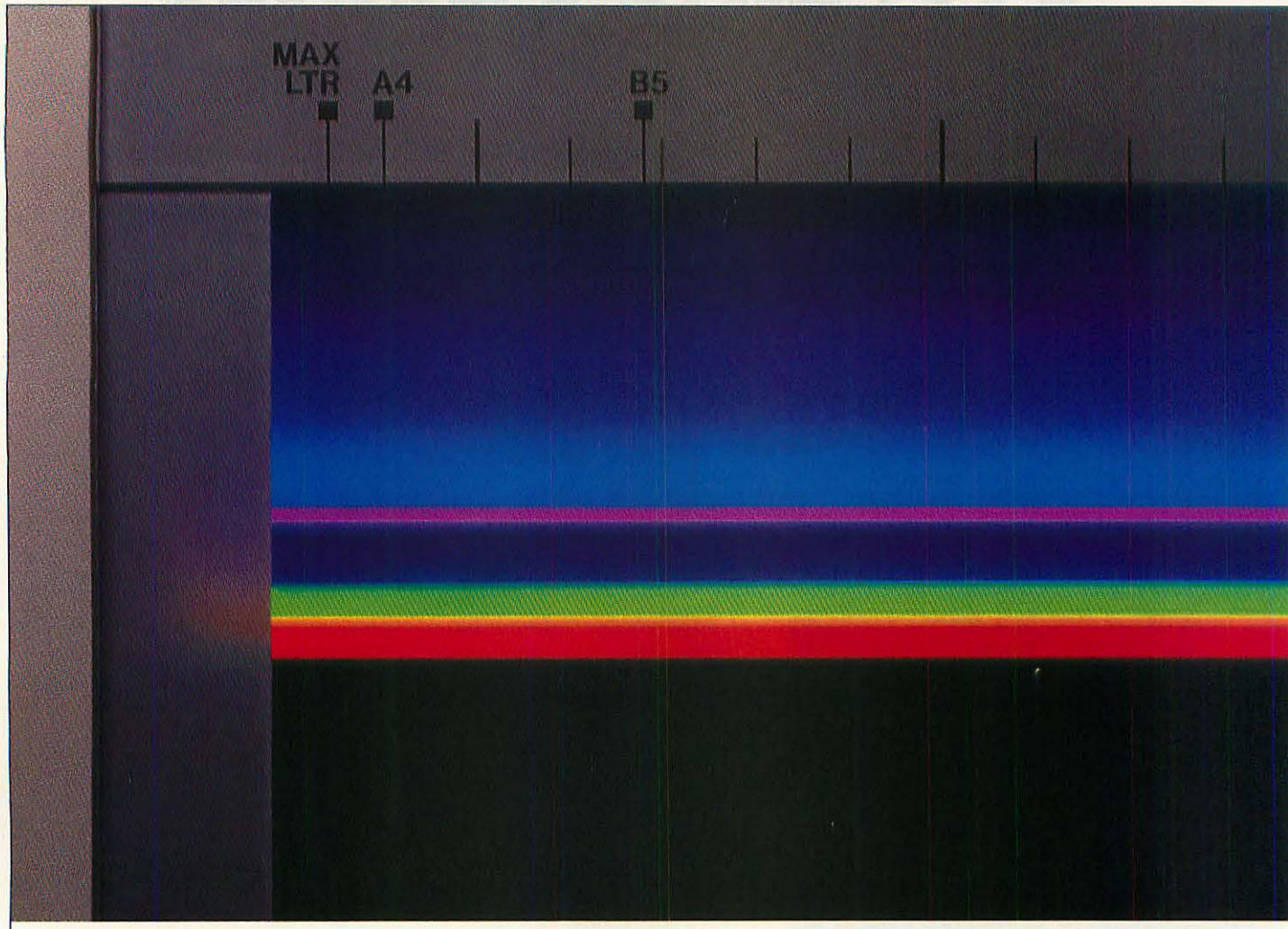

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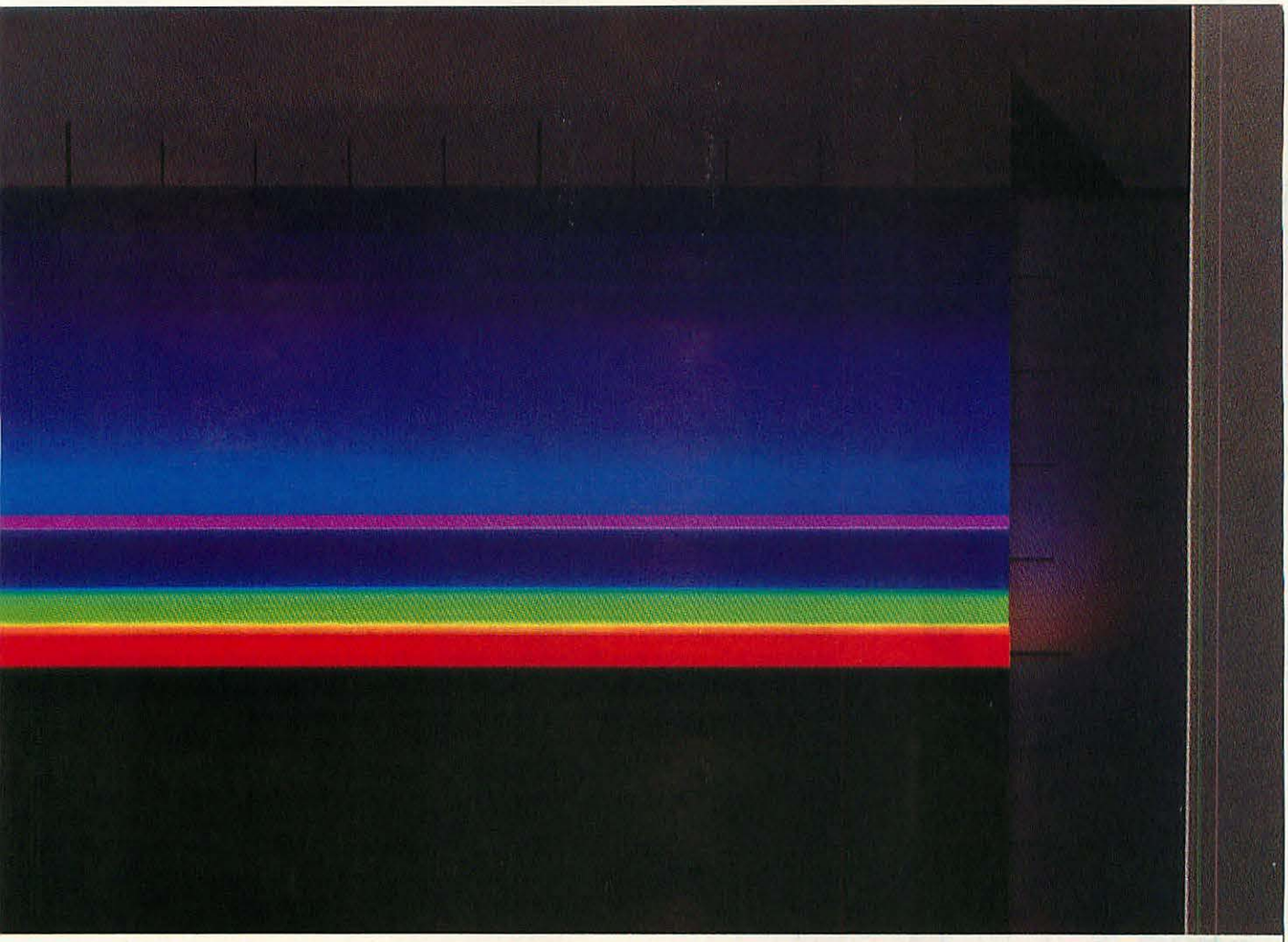

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COMMON MACINTOSH REPAIRS

Models	Repairs	Dealer Prices	Independent Repair
Mac Plus	analog board	$175–$282	$75–$125
Mac SE and SE/30	analog board	$179–$357	$60–$145
	power supply	$179–$339	$70–$170
Mac II	logic board	$400–$639	$85–$510
All Macs	800K floppy drive	$169–$321	$99–$220
	SuperDrive	$100–$421	*$145–$300*
ImageWriter	print head*	$140–$216	$125–$185
LaserWriter	fuser roller assembly*	$350–$447	$145–$360

**Includes maintenance.*

Apple dealers' repair prices vary by dealer and region (and can even vary within the same town). Manhattan dealers charged the most for their labor, at $75 an hour in the shop and $150 for the first hour during house calls. A dealer based in Boulder, Colorado, was also an expensive date, charging $639 to replace a faulty Mac II logic board. (Subtracting the $60 labor charge reveals a more than 50 percent markup on that particular part, and other repairs there were also high.) As the chart shows, independent repair services generally charge less to fix troubled Macs. But some Apple dealers do offer good prices. One example is Computers Plus of Phoenix, Arizona, which at press time charged only $100 to replace a SuperDrive and $169 for an 800K floppy drive. The prices shown above do not include a diagnostics fee for determining a problem.

hardware problems, such as inserting a floppy disk with a bent cover into a floppy drive, which can ruin the drive's head when the floppy is pulled out again. Plugging and unplugging peripherals while the computer is on is stupid; it may blow a fuse or an active filter, inexpensive parts in themselves but expensive when bought as part of a larger assembly.

Timothy Marshall is service manager for the ComputerWare store (408/458-1644), an authorized Apple dealer in Santa Cruz, California. The biggest problem he's seen with ImageWriters is caused by labels stuck in the fuser assembly. Users forget that rolling adhesive labels backwards pulls labels off the backing. So be careful. Other recommendations: keep the Mac away from smoke and dirt, and buy a surge protector. If there is a power surge and the computer "is up and online, it can take out a power supply instantly," Marshall says. He also recommends AppleCare as a good deal and says prices for AppleCare can vary from store to store.

Dealing with Drives Some national services specialize in fixing disk drives and recovering data. Several disk drive repair companies are mentioned in the March *Conspicuous Consumer* column on data-recovery services. Two additional companies to note are Mipro III of Redwood City, California, and DriveSavers of Novato, California.

Steve Burgess, president of Mipro III (415/306-1100), says his five-year-old company charges between $75 and $350 to repair a drive, depending on its size. Mipro quotes a two-week turnaround time, but Burgess says drives are usually repaired within four days and carry a six-month warranty.

Scott Gaidano, formerly of Jasmine Technology, is now the president of DriveSavers (415/883-4232), an all-Mac hard drive repair, data recovery, and upgrade service. Gaidano says the new company has a 72-hour turnaround. Repair costs range from $125 for a 20MB drive to $300 for 280MB to 300MB drives. The warranty is 90 days.

Questions to Ask No matter how careful you are, there may come a day when you have to have the Mac repaired. Here are some questions to ask any service provider.

- Are the technicians Apple-certified?
- Will you be charged if no problem is found? Shreve Systems, for example, charges for checking out a Mac. MicroMat (415/898-6227), in Novato, California, does not.
- How long is the warranty?
- What is the turnaround time? Independents, such as CJS Systems (415/548-2353) in Berkeley, California, argue that the company's fast turnaround time is one of the biggest reasons

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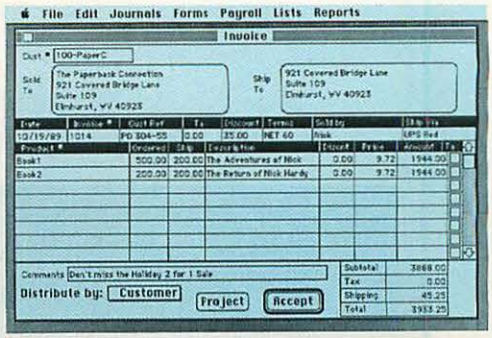

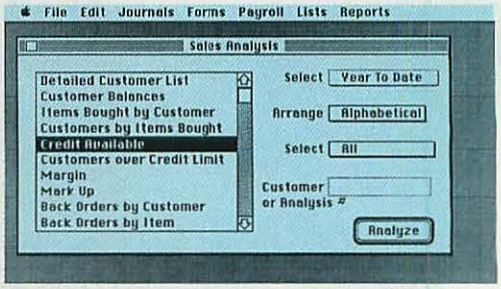

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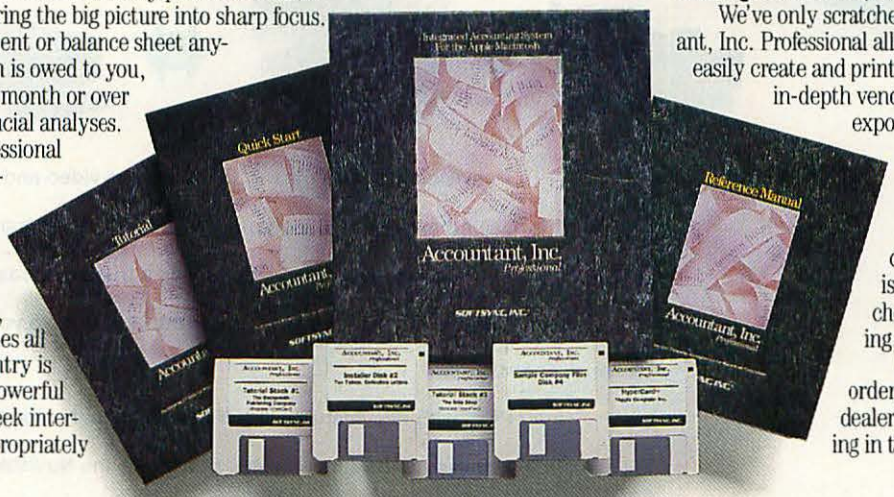

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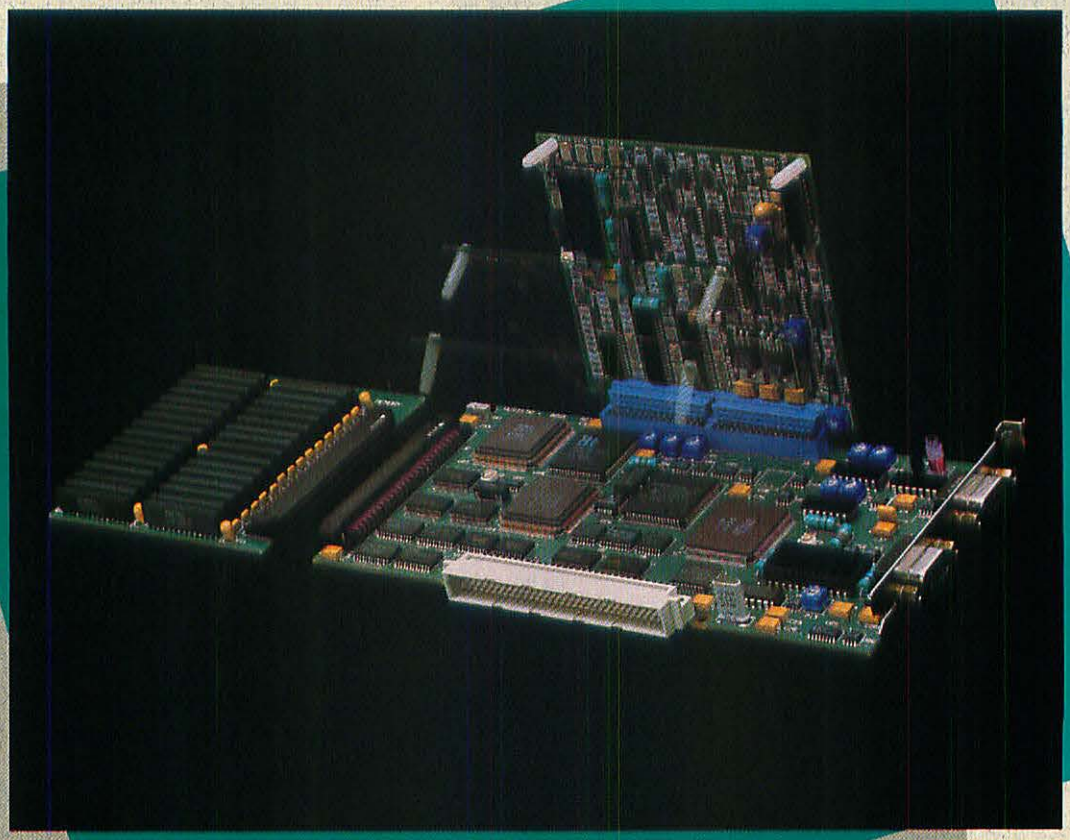
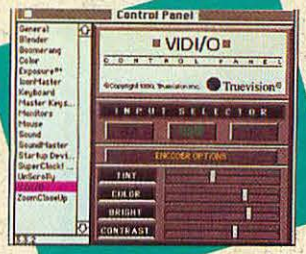


Truevision provides the key to integrating video and the Macintosh®. Now it's easier than ever to videotape your presentations, training materials or animations, thanks to NuVista+. It provides a true broadcast-quality signal for video in and video out. Simply connect the NuVista+ to your VCR and record.

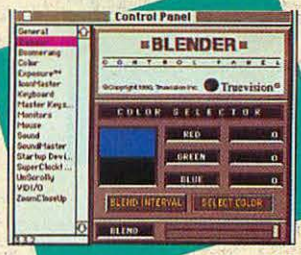
Plus, with new features like digital linear and chroma keying, it's simple to achieve professional results. Best of all, the NuVista+ has reduced the cost of professional quality video production while adding exciting new features.

NuVista+ Is Your Key To Video Production.



Your Key To Video Connections.

Making the right connections simplifies most projects. So the NuVista+ now offers composite and S-Video encoding and decoding on-board, making it easy for you to connect to any video source. The encoder and decoder adjustments are accessible from any application through the Control Panel. Controls for signal source selection, hue, saturation, and contrast are all easy to use.



New Keys For Creativity.

The new linear keying functions are accessible from the Control Panel and let you fade to any color or blend live video with computer generated text and images. And now you can choose any color, even in 32 bit/pixel mode, to overlay a computer-generated image or animation onto live video.

Savings and Flexibility Are Key, Too.

Just by integrating the video encoding and decoding onto the NuVista+, we saved you the cost of a VIDI/O™ Box. But we didn't stop there. We've incorporated the new keying features which previously required additional expensive peripherals. And we've added flexible memory upgrades.

The NuVista+ base model, packed with all these features, is priced at $2995. It contains 1MB of high-speed VRAM, making it ideal for 16 bit/pixel video. And you can upgrade to a 2MB or 4MB configuration for 32 bit/pixel NTSC or PAL production. See your local Truevision Reseller for more info, or call us at 800/858-TRUE.

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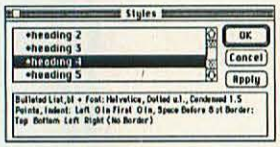

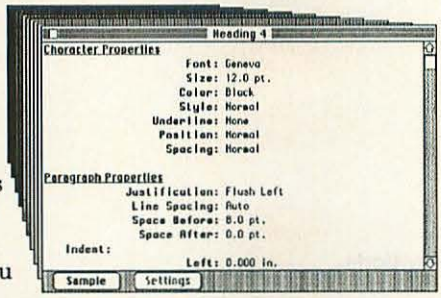

More than anything else, Word's style sheet capabilities separate it from the pack. If you're confused by the style dialogs, you may be missing out on all that formatting power. **Stylist** unlocks the secrets of Word style sheets by displaying and printing their contents in beautifully organized windows and reports. Compare Word's dialog (left) with **Stylist**'s *ZOOM* window (right), and you'll see what we mean! Available now for only $79.95.

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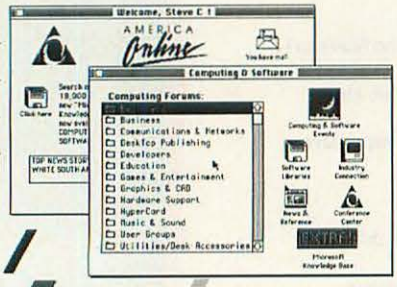

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SERVICE HERO

Easy Envelopes Plus "was everything promised and more. Unfortunately, the more was an extra line of print across the top of each envelope," writes Robert Chell of Harrisonburg, Virginia. He wrote Mark 3 Software about the problem and received, to his surprise, a disk with another copy of the program and nine other programs. Alas, the problem persisted. "I left a message for Andrew Welch on one of the networks. I received an answer and a better solution than I dreamed possible—a program upgrade with even more features. Problem solved." Chell commends Welch and Mark 3 Software for low prices, elegant programming, and superb support.

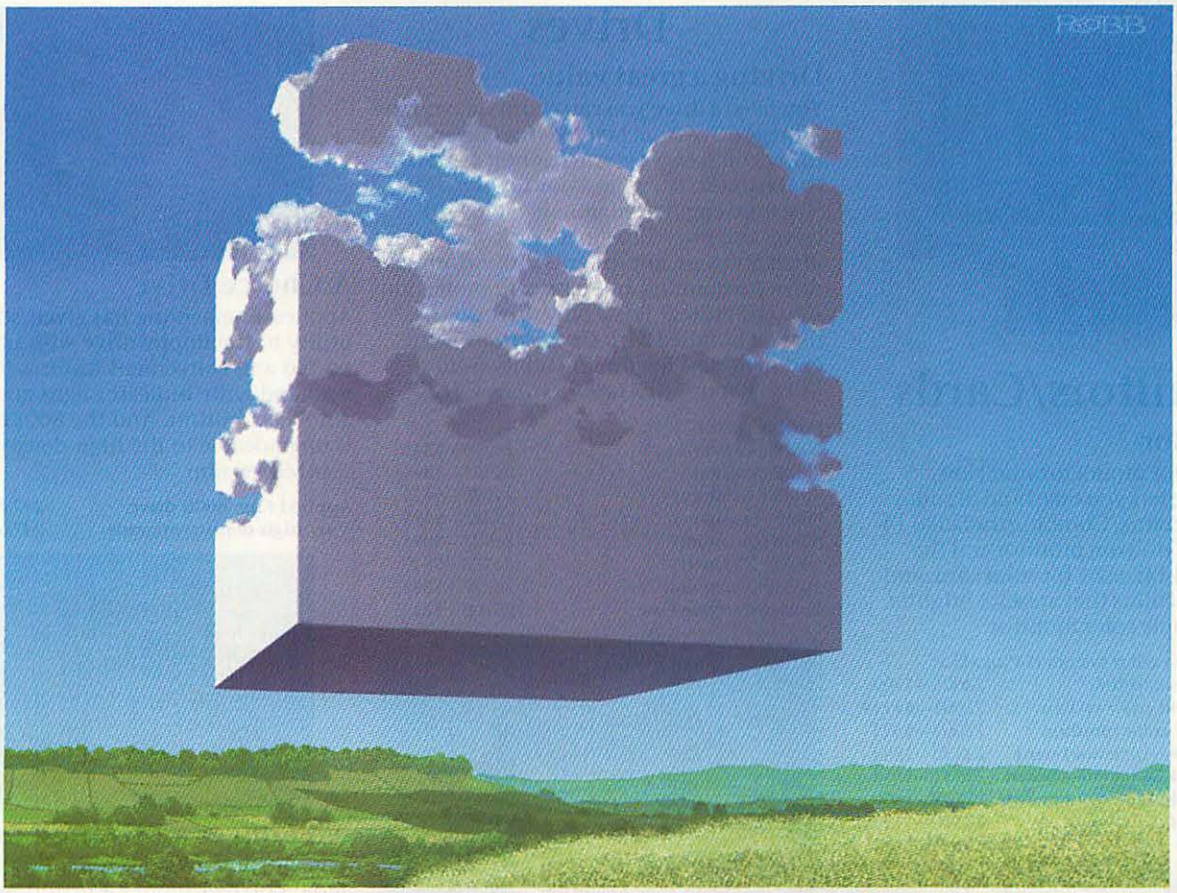
consumers choose ISPs.

- What is the price?
- What is the source of parts? Some Apple parts are difficult to locate; as a result, independents sometimes buy gray-market parts. That can slow down your repair if the needed part isn't in stock.
- Are there special services available? Mac Service Connection (415/457-6744) in San Rafael, California, offers loaner hard drives and free telephone support, according to owner Keith Eggel. MacHeaven (703/263-2567) of Chantilly, Virginia, is a national company that buys and sells used Macs as well as repairs them. Owner Jim Irby says the company will pick up and deliver machines at no cost within the local area.

A broken Mac isn't any fun, but armed with information and the right questions, it doesn't have to be an expensive tragedy either. ■

Send nominees for sainthood to Service Heroes, Macworld, *501 Second St., San Francisco, CA 94107 or via AppleLink (Macworld1) or Connect (Branscum). Conversely, drop* Conspicuous Consumer *a line if a company is ignoring you.*

Second Nature.



"Skybox" by Ron Cobb placed first in SuperMac's 2nd annual PixelPaint Professional art contest.

Image created entirely in PixelPaint Professional.

Introducing PixelPaint Professional® 2.0.

The folks who made it easy for you to create your own world with PixelPaint Professional now give you a second chance to improve nature's handiwork—with PixelPaint Professional 2.0, new from SuperMac.™

PixelPaint Professional 2.0 lets you design and create your own stunning, photorealistic, 32-bit color images using the paint tools you already know and love. Plus some fantastic new advanced features you're sure to enjoy.

Features like multiple document support, for up to 8 different images on screen simultaneously. Higher pixel resolutions for massive images up to 4K by 4K in size. Wet paint and pressure sensitive tools for superior placement and stroke control. Plus sophisticated 8-bit masking for complex designs and illustrations.

When you need to create the impossible, just do what comes naturally—use PixelPaint Professional 2.0.

Call **1-800-624-8999, ext. 210**, or see your local SuperMac software reseller.

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Wild Color

Why settle for monochrome? Now, MacAvenue lets you take hold of some screaming colors. Combine the Seiko 14-inch Sony Trinitron monitor and the RasterOps 8-bit or 24-bit color card, and you'll have colors that are 43% brighter than the Apple color monitor.

Complete 8-bit color system (14" monitor with Color Board 208)	*22005*—$909
Compete 24-bit color system	*22001*—$1119
Seiko 14-inch color monitor	*22002*—$595
RasterOps 208 8-bit color board	*23538*—$344
RasterOps 264 24-bit color board	*23531*—$554
RasterOps 264 SE/30 color board	*23539*—$690
RasterOps 364 color board	*23540*—$1390

Drives

Driving a great value

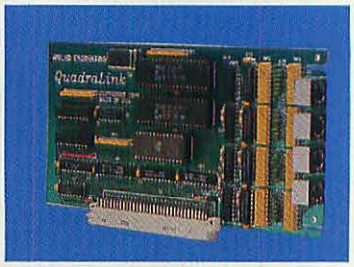
You need a drive you can count on, and the Protegé drive from MacAvenue is everything you'd expect from the best drive in the business. It's quiet, cool, quick, elegantly engineered, tough enough to travel and priced to move. Disk Management Software implements disk spanning, drive partitioning and password protection. And the Protegé is the only drive on the market bundled with ***On Location*** — the excellent new file-finding utility from Mitch Kapor — ***a $129.95 value. FREE!***

Protegé drives	
20MB (Seagate)	*24380*—$345
40MB (Seagate)	*24381*—$395
40MB (Quantum)	*24390*—$455
80MB (Seagate)	*24382*—$525
80MB (Quantum)	*24391*—$645
100MB (Conner)	*24383*—$649
105MB (Quantum)	*24392*—$695
Protegé Carrying Case	*26908*—$24

A Choice Drive

Applied Engineering has given added utility to the floppy drive with unexpected and convenient features like a read and write indicator light and an auto eject button. And the 800KB drive is upgradeable to the high-density 1.44MB version.

Applied Eng. 800K drive.	*24735*—$205
w/ high-density upgrade	*24736*—$239



No Longer a Missing Link

The QuadraLink adds four additional serial ports with one card, and makes all four ports easily accessible in the back of your cpu. And don't worry about compatibility because the QuadraLink includes a "shadow driver" so the ports will be recognized by older software.

Applied Eng. QuadraLink.	*26918*—$205

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Printers

Buy the TI microLaser — you'll save money and get a great printer in the bargain. This Macintosh-compatible PostScript printer is compact, user-friendly, upgradeable and affordable. Featuring a complete package of Adobe PostScript and HP LaserJet Series II emulations, the microLaser PS prints at 300x300 dpi and flaunts 11 PostScript font families with a total of 35 different fonts. And, at just over a foot square, the microLaser fits neatly on your desk. If you want a really high-powered machine, build the standard 1.5MB RAM up to 4.5MB. The microLaser is AppleTalk-ready and compatible with the Centronics parallel interface.

microLaser PostScript printer with AppleTalk	*22851*—$2095
Envelope Feeder	*23056*—$279
Second Drawer Feeder/w Ltr Tray	*23058*—$285
TI microLaser RAM upgrade	*38563*—$399
Legal Paper Tray	*23057*—$59.00

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Hardware

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24731	800K Floppy Drive *(Fujitsu)*	$145
24730	2.4M Floppy Drive *(Kennect Technologies)*	$325
24732	DaynaFile 5.25" 1.2MB Floppy	$550
24733	DaynaFile 5.25" 360K/1.2MB	$725
24930	Rapport Disk Drive *(Kennect Technologies)*	$195
24380	20MB Ext. Protegé HD *(CompuAdd)*	$345
24386	20MB Ext. HD *(Cutting Edge)*	$335
24381	40MB Ext. Protegé HD *(CompuAdd)*	$395
24387	40MB Ext. HD *(Cutting Edge)*	$430
24390	40MB Ext. Qtm. Protegé HD *(CompuAdd)*	$455
24382	80MB Ext. Protegé HD *(CompuAdd)*	$525
24388	80MB Ext. HD *(Cutting Edge)*	$579
24391	80MB Qtm. Protegé HD *(CompuAdd)*	$645
24383	100MB Ext. Protegé HD *(CompuAdd)*	$649
24389	100MB Ext. HD *(Cutting Edge)*	$779
24392	105MB Ext. Qtm. Protegé HD *(CompuAdd)*	$695
24180	20MB Int. HD - SE *(CompuAdd)*	$295
24184	20MB Int. HD -Mac II *(CompuAdd)*	$295
24181	40MB Int. HD - SE *(CompuAdd)*	$325
24185	40MB Int. HD -Mac II *(CompuAdd)*	$325
24182	80MB Int. HD - SE *(CompuAdd)*	$465
24186	80MB Int. HD -Mac II *(CompuAdd)*	$465
24183	100MB Int. HD -SE *(CompuAdd)*	$575
24187	100MB Int. HD -Mac II *(CompuAdd)*	$575
24384	Bernoulli 40-40 *(IOmega)*	$2,195
24385	Portable 44MB *(IOmega)*	$1,850
23830	QT-40 40MB Tape Sys *(Tecmar)*	$950
23831	QT-80 80MB Tape Sys *(Tecmar)*	$1,225
24931	QT-40 Cable Kit *(Tecmar)*	$106
26080	QT-80MB/2 Cart. *(Tecmar)*	$85
57440	3.5" Diskettes 1.2MB 10Pk" *(Sony)*	$29
57401	3.5" Diskettes 800KB 10Pk" *(Sony)*	$15
41601	Teak 3.5" Double Rolltop Box	$29
41600	Teak 3.5" Single Diskette Box	$20

Printers, Scanners & FAXes

56800	HP LaserJet Series II *(Hewlett-Packard)*	$1,699
22851	MicroLaser PostScript w/ATalk*(Texas Inst)*	$2,114
22850	DeskWriter Inkjet *(Hewlett-Packard)*	$849
56339	LQ-2550 - 24 pin Prtr. *(Epson)*	$999
56340	LQ-510 - 24 pin Prtr. *(Epson)*	$339
56303	LX 810 - 9 pin Prtr. *(Epson)*	$195
22852	Label Printer *(Seiko Inst.)*	$195
22752	Half-page Scanner *(Complete PC)*	$313
22753	Page Scanner *(Complete PC)*	$758
22758	Computer Eyes B/W Scan *(Digital Vision)*	$196
22759	Computer Eyes Color *(Digital Vision)*	$344
22750	Scanjet w/interface*(Hewlett-Packard)*	$1,689
22755	300Z Color Scanner *(MicroTek-IMSI)*	$2,049
22756	MS-II B&W Scanner *(MicroTek-IMSI)*	$1,080
22757	Thunderscan Plus *(Thunderware)*	$199
22751	ScanMan 32 *(Logitech)*	$345
22701	DoveFax-Ext. *(Dove)*	$270
22700	TeFAX RA2110 *(Relisys)*	$1,095
26902	Labels for Seiko Label Printer *(Seiko)*	$11.99
38713	Second Paper Drawer *(Texas Inst.)*	$325
38712	Envelope Feeder *(Texas Inst.)*	$299
38564	Appletalk Comm. Cd. 232 *(Texas Inst.)*	$125
38563	1MB Memory Upgrade Kit *(Texas Inst.)*	$399
38311	MicroLaser Toner Cartridge *(Texas Inst.)*	$59

Communications - Modem

49525	1200 Ext. w/o SW *(CompuAdd)*	$89
49557	2400 Ext w/o SW *(CompuAdd)*	$129
22306	Datalink Express *(Applied Eng.)*	$215
22308	Datalink Macport. *(Applied Eng.)*	$299
22307	Datalink Mac *(Applied Eng.)*	$325
49501	Smartmodem 1200 *(Hayes)*	$299
49576	Smartmodem 2400 *(Hayes)*	$385
49578	Smartmodem 9600 *(Hayes)*	$895
22507	NetModem V2400 *(Shiva)*	$435
22528	NetModem V.32 9600 baud *(Shiva)*	$1,289
22309	MMPL5 Protocal adapt. *(Applied Eng.)*	$79
22310	Send Fax Adapter *(Applied Eng.)*	$79

Communications - Network

22500	Nodem Thick *(Adaptec)*	$395
22527	Nodem Thin *(Adaptec)*	$395
22508	Ethergate *(Shiva)*	$1,825
22510	FastPath 4 Gateway *(Novell)*	$1,935
22509	Interbridge *(Hayes)*	$645
22520	Localtalk Conn. DB-9 *(Interex)*	$32
22521	Localtalk Conn. Din-8 *(Interex)*	$32
22538	MacCon II/E *(Asanté)*	$395
22529	MacCon II/E UTP *(Asanté)*	$395
22530	MacCon SE30/E *(Asanté)*	$395
22531	MacCon SE30/ETP *(Asanté)*	$395
22526	MacCon SE30/TK *(Asanté)*	$395
22533	MacCon SE/E *(Asanté)*	$295
22525	MacCon SE/ETK *(Asanté)*	$295
22532	MacCon SE/ETP *(Asanté)*	$292
22505	NetBridge *(Shiva)*	$339
22504	NetSerial X232 *(Shiva)*	$275
22511	PhoneNet Connector DB-9 *(Farallon)*	$34
22513	PhoneNet Connector Din-8 *(Farallon)*	$31
22517	PhoneNet Repeater *(Farallon)*	$313
22515	PhoneNet Star Conn. 10 pk *(Farallon)*	$138
22512	PhoneNet Star Connector *(Farallon)*	$18

Communications - Network *(continued)*

22516	PhoneNet Star Controller *(Farallon)*	$888
22514	PhoneNet to Localtalk Adapt. *(Farallon)*	$31
22534	PhonNet Din-8 10pk *(Farallon)*	$215
22519	Portable Pack *(Farallon)*	$373
22518	Star Wiring Kit Harmonica *(Farallon)*	$64
22506	TeleBridge *(Shiva)*	$339

Monitors & Video Cards

22006	19" Mon. w/Color Bd. 208 *(Rasterops)*	$3,990
22008	L-View Multi. Mon. w/card *(Sigma Designs)*	$1,495
22002	14" Color Monitor w/o card *(Seiko Inst.)*	$595
22000	19" Colormax w/card *(Sigma Designs)*	$4,999
22100	PageView 15" Mon. Mac II *(Sigma Designs)*	$1,050
22101	PageView 15" Mon. SE *(Sigma Designs)*	$999
22106	PageView 15" Mon. SE/30 *(Sigma Designs)*	$1,050
22005	14" Mon. w /Color Bd. 208 *(Seiko/Rasterops)*	$909
22001	14" Mon. w/Color Bd. 264 *(Seiko/Rasterops)*	$1,119
22103	SilverView 21" Mon. SE/30 *(Sigma Designs)*	$1,599
22104	SilverView 21" Mon. Mac II *(Sigma Designs)*	$1,599
22107	SilverView 21" Mon. SE *(Sigma Designs)*	$1,599
22007	GS30 Grey Scale 19" Mon. *(Rasterops)*	$1,614
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23531	Color Board 264 *(Rasterops)*	$554
23539	Color Board 264/SE-30 *(Rasterops)*	$690
23530	Multiscreen Card *(Mobius)*	$295
23541	SE/30 8-Bit 640x480 *(Micron)*	$345
23542	SE/30 8-Bit 1024x768 *(Micron)*	$585
23543	IIci 8-Bit 640x480 *(Micron)*	$345
23544	IIci 8-Bit 1024x768 *(Micron)*	$345

Accelerator & Expansion Boards

23632	Acc. 030 25mhz II w/co 68882 *(DayStar)*	$1,149
23633	Acc. 030 33mhz II w/co 68882 *(DayStar)*	$1,539
23638	Acc. 030 40mhz II w/co 68882 *(DayStar)*	$1,919
23639	Acc. 030 50mhz II w/co 68882 *(DayStar)*	$2,309
23644	Acc. 030 25mhz IIx w/co 68882 *(DayStar)*	$1,149
23645	Acc. 030 33mhz IIx w/co 68882 *(DayStar)*	$1,539
23646	Acc. 030 40mhz IIx w/co 68882 *(DayStar)*	$1,919
23643	Acc. 030 50mhz IIx w/co 68882 *(DayStar)*	$2,309
23647	Acc. 030 50mhz IIcx w/co 68882 *(DayStar)*	$2,309
23640	Acc. 030 25mhz IIcx w/co 68882 *(DayStar)*	$1,149
23641	Acc. 030 33mhz IIcx w/co 68882 *(DayStar)*	$1,539
23642	Acc. 030 40mhz IIcx w/co 68882 *(DayStar)*	$1,919
23636	Acc. Dove 33mhz SE-30 board *(Dove*	$445
23637	Acc. Dove SE 020 w/881 & 1MB *(Dove)*	$777
23634	Acc. IIci CACHE Card *(DayStar)*	$754
23733	DigiVideo B/W Card *(Aapps)*	$399
23735	DigiVideo Color Card *(Aapps)*	$644
23731	MicroTV *(Aapps)*	$275

Memory Expansion

25480	2 X 1MB SIMMS (80ns) *(Technology Works)*	$138
25482	4 X 1MB SIMMS (80ns) *(Technology Works)*	$276
25481	4 X 4MB SIMMS (80ns) *(Technology Works)*	$1,900
25484	4 X 1MB SIMMS FX *(Technology Works)*	$436
25483	4 X 1MB SIMMS NTX *(Technology Works)*	$436

Keyboards, Mice, Etc.

25184	15 function key module *(DataDesk)*	$37
25283	Little Mouse *(Mouse Systems)*	$77
25180	Mac-101 Keyboard, ADB *(DataDesk)*	$134
25181	Mac-101 Keyboard (beige) *(DataDesk)*	$134
25282	Mobius Cordless Mouse *(Mobius)*	$89
26885	Bit Pad Plus *(Summagraphics)*	$318
25183	Switchball *(DataDesk)*	$115
25182	Switchboard *(DataDesk)*	$174
25284	Trackball ADB *(Mouse Systems)*	$72
25280	Turbo Mouse Plus *(Kensington)*	$107
25281	Turbo Mouse ADB *(Kensington)*	$107
26880	Fanny Mac (fan) *(Mobius)*	$58
26888	System Saver Mac Plus *(Kensington)*	$62
26889	System Saver Mac SE *(Kensington)*	$62
26293	Powerchute Ntwk UPS Software *(A.P.C.)*	$99
26292	UPS, Uninterruptible supply *(A.P.C.)*	$207

Accessories

41753	Keyboard drawer *(CompuAdd)*	$19
41019	Kleen Keyboard Kit *(CompuAdd)*	$10
26883	SE Anti-Glare Filter (platinum) *(Kensington)*	$32
26882	SE Anti-Glare Filter (beige) *(Kensington)*	$32
26891	Apple RGB Anti-Glare Filter *(Kensington)*	$62
26886	HyperDialer *(DataDesk)*	$32
26895	Imagewriter II Dust Cover *(Cover-up)*	$8
26897	LaserWriter II Dust Cover *(Kensington)*	$12
26898	MacAvenue Carrying Case *(Pace)*	$65
26901	MacAvenue Carrying Case Ext. Kbd. *(Pace)*	$76
26892	Mac II Stand & Cable Kit *(Kensington)*	$63
26887	Mac II System Stand *(Kensington)*	$20
26894	Mac Plus/SE Dust Cover *(Cover-up)*	$8
26893	Masterpiece Mac II *(Kensington)*	$103
26896	Universal Printer Stand *(Kensington)*	$15
25580	Mac II Monitor Stand *(Kensington)*	$62
25582	Tilt/Swivel Stand *(Kensington)*	$23
26884	Security Kit *(Kensington)*	$33
41752	Teak KB Drawer PSK 132 *(CompuAdd)*	$72
26903	The Library (grey) *(Innovative Technology)*	$12
41026	Vacumn w/hose *(CompuAdd)*	$49
41035	Datavac Bags *(5pk)*	$2.95
41131	Eleven Piece Tool Kit *(CompuAdd)*	$12
57440	Sony 3.5" Diskettes 1.2MB 10Pk *(Sony)*	$29
57804	Tape Cart: Bernoulli B33C 44MB *(Bernoulli)*	$82

Sound Interfaces

23730	MacRecorder *(Farallon)*	$162
23732	MIDI Interface *(Passport Designs)*	$76

Software

Writing & Publishing

Word Processing (Writing)

30600	FullWrite Prof. *(Ashton-Tate)*	$253
30586	MacWrite II 1.1 w/ ATM *(Claris)*	$157
30582	Microsoft Word *(Microsoft)*	$245
30580	Microsoft Works *(Microsoft)*	$177
30584	Microsoft Write *(Microsoft)*	$77
30602	Nisus *(Paragon Concepts)*	$236
30591	WordPerfect Mac *(WordPerfect)*	$229
30588	WriteNow *(TiMaker)*	$116

Page Layout (Publishing)

29792	Letraset Ready-Set-Go *(Letraset)*	$273
29781	Pagemaker *(Aldus)*	$497
29822	Publish-it *(Timeworks)*	$223
29802	Quark Xpress 2.11 *(Quark)*	$455
29796	Silicon Press *(Silicon Beach)*	$51
29814	Springboard Publisher *(Springboard)*	$107

Utilities for Writers/Publishers

30606	Acta Advantage *(Symmetry)*	$63
30618	Big Thesaurus1.0 *(Deneba Software)*	$63
30594	Findswell *(Working Software)*	$35
30440	Letter Writer Plus *(Power Up)*	$54
29820	MacKern *(ICOM Simulations)*	$113
30605	More II *(Symantec)*	$265
29786	PageMaker Color Ext. *(Aldus)*	$133
29800	QuarkStyle 1.0 *(Quark)*	$165
30598	QuickLetter *(Working Software)*	$72
30622	WordFinder 2.0 *(Microlytics)*	$31

Spelling Checkers

30620	Spelling Coach Pro 3.1 *(Deneba Software)*	$112
30596	Spellswell *(Working Software)*	$44

Fonts & Font Utilities

	Adobe Fonts All 134 available	CALL
30444	Freedom of Press *(Custom Applications)*	$255
29824	Type Manager *(Adobe)*	$55
29828	Type Mgr/Type Align *(Adobe)*	$88
29830	Type Reunion *(Adobe)*	$38
29826	TypeAlign *(Adobe)*	$58

Business Software

Integrated & Bundled Applications

30182	Microsoft Office Bundle *(Microsoft)*	$525
30580	Microsoft Works *(Microsoft)*	$177

Accounting/Bookkeeping

28481	Accountant Inc. Prof *(Softsync)*	$348
28466	Business Sense *(Monogram)*	$265
28468	Checkwriter II *(Aatrix)*	$37
28464	Dollars & Sense *(Monogram)*	$78
28474	Easy-Light *(DAC)*	$41
28440	Insight Accounts Payable *(Layered)*	$395
28442	Insight Accounts Receivable *(Layered)*	$395
28454	Insight At Once *(Layered)*	$283
28444	Insight General Ledger *(Layered)*	$395
28446	Insight Inventory *(Layered)*	$395
28448	Insight Payroll *(Layered)*	$395
28450	Insight Time Bill *(Layered)*	$395
28478	MacMoney 3.5 *(Survivor Software)*	$58
28462	Managing Your Money *(Meca)*	$122
28458	Quicken *(Intuit)*	$36

Data Analysis & Presentation

28470	StatView II (Mac+,SE, II)*(Abacus Concepts)*	$278
28472	StatView SE + Graphics *(Abacus Concepts)*	$199

Database

27780	4th Dimension *(Acius)*	$511
27782	4th Dimension Runtime *(Acius)*	$85
27789	Claris Filemaker II*(Claris)*	$216
27804	Double Helix *(Odesta)*	$369
27790	FoxBase II *(Fox Software)*	$292
27792	FoxBase II Runtime *(Fox Software)*	$176
27796	FoxBase Mltuser Runtime *(Fox Software)*	$293
27794	FoxBase Multiuser *(Fox Software)*	$385
27798	Microsoft File *(Microsoft)*	$123
27808	Panorama (ProVue)	$246

Time & Project Scheduling

29744	Fast Track Schedule *(AEC)*	$108
27810	KeyPlan *(Symmetry)*	$243
29740	MacProject II 1.1 *(Claris)*	$366

Office Productivity Programs & Utilities

30442	Address book Plus *(Power-up)*	$52
27812	BulkMailer 3.3 *(Satori Software)*	$76
27814	BulkMailer Plus *(Satori Software)*	$187
30432	Calender Creater + Mac *(Power Up)*	$36
30358	Calender Maker *(CE Software)*	$30
27818	Data Desk 3.0 *(Odesta)*	$347
30438	Fast Forms 2.0 *(Power-up)*	$116
30372	Kiwi Envelopes *(Kiwi Software)*	$34
30440	Letter Writer Plus *(Power Up)*	$54
27816	MailList *(MySoftware)*	$27
27806	Milo (Paracomp)	$156
29200	Smartforms Designer *(Claris)*	$294

Spreadsheet Programs & Templates

30180	Excel 2.2 *(Microsoft)*	$245
30186	Full Impact *(Ashton-Tate)*	$245
30580	Microsoft Works *(Microsoft)*	$177
30184	Wingz *(Informix)*	$245
28476	101 Macros for Exel *(Individual Software)*	$35

Communications

On the Modem

27708	Carbon Copy Mac *(Microcom)*	$119
27702	CompuServe Info Serv *(CompuServe)*	$23
27705	CompuServe Navigator 3.0 *(CompuServe)*	$49
27706	Connect v. 1.5 *(Connect)*	$93
27672	Desktop Express *(Dow Jones)*	$94
27710	LapLink 2.0 *(Traveling Software)*	$119
27660	Microphone II *(Software Ventures)*	$213
30580	Microsoft Works *(Microsoft)*	$177
27670	News/Retreival Membership *(Dow Jones)*	$23
27662	SmartCom II *(Hayes)*	$84
27668	Timbuktu Remote *(Farallon)*	$123
27664	White Knight *(Freesoft)*	$89

On the Network

27700	In/Out 10 User *(CE Software)*	$187
27698	In/Out 5 User *(CE Software)*	$125
27690	InBox Connection *(Tops)*	$41
27688	InBox Starter *(Tops)*	$143
27680	MS Mail 20 Pack *(Microsoft)*	$959
27678	MS Mail Server *(Microsoft)*	$246
27676	MS Mail Workstation *(Microsoft)*	$83
27686	NetPrint v. 2.0 *(Tops)*	$115
27696	Quickmail 10 Pack *(CE Software)*	$313
27695	Quickmail 5 User v2.2 *(CE Software)*	$210
27692	Quickmail Remote *(CE Software)*	$32
27666	Timbuktu 3.0 *(Farallon)*	$95
27685	Tops Network Bundle/DOS *(Tops)*	$159
27682	Tops Network Bundle/Mac *(Tops)*	$187
27674	TrafficWatch *(Farrallon)*	$127

Education & Entertainment

On the Learning Curve

27948	Animal Kingdom *(Unicorn)*	$26
27956	Atlas Explorer *(Springboard)*	$27
27964	Calculus *(Broderbund Software)*	$57
27976	Dinosaur Discovery Kit *(Byte)*	$26
27982	First Shape *(Byte)*	$31
27962	Geometry *(Broderbund Software)*	$57
27990	KidsMath *(Great Wave)*	$25
27988	KidsTime *(Great Wave)*	$24
27952	MacRobots *(Unicorn)*	$26
27968	Math Blaster! *(Davidson & Associates)*	$29
27970	Math Blaster Mystery *(Davidson & Assoc.)*	$27
27950	Math Wizard *(Unicorn)*	$26
27992	NumberMaze *(Great Wave)*	$25
27966	Physics *(Broderbund Software)*	$57
27974	Puzzle Storybook *(Byte)*	$26
27954	Read-A-Rama *(Unicorn)*	$31
28000	Reader Rabbit *(Learning Company)*	$30
27972	Speed Reader II *(Davidson & Associates)*	$29
27984	Speller Bee *(Byte)*	$31
28002	Talking Math Rabbit *(Learning Company)*	$31
27986	TimeMasters *(Great Wave)*	$21
27958	Type! *(Broderbund Software)*	$18
28014	Typing Instructor Encore *(Individual Software)*	$15
28008	Typing Tutor *(Simon & Schuster)*	$28
28004	Voyager *(Carina Software)*	$87

Just for the Fun of It (Games)

28692	4th and Inches *(Accolade)*	$26
28668	Ancient Art of War *(Broderbund)*	$25
28670	Ancient Art of War at Sea *(Broderbund)*	$25
28648	Apache Strike *(Silicon Beach)*	$31
28632	Balance of Power 1990 *(Mindscape)*	$31
28654	Bard's Tale *(Electronic Arts)*	$30
28646	Beyond Dark Castle *(Silicon Beach)*	$31
28738	Bomber *(In-Line Design)*	$25
28656	Chuck Yeager Flight Sm *(Electronic Arts)*	$30
28634	Colony *(Mindscape)*	$28
28700	Cosmic Osmo *(Activision)*	$40
28638	Crossword Magic *(Mindscape)*	$28
28704	Crystal Quest 2.2T *(Casady & Greene)*	$24
28706	Crystal Quest 2.2T w/edit *(Casady&Greene)*	$39
28650	Dark Castle *(Silicon Beach)*	$32
28636	Deja Vu II *(Mindscape)*	$28
28614	Falcon *(Spectrum Holobyte)*	$30
28684	Ferrari Grand Prix *(Bullseye)*	$32
28682	Fokner Tri-plane *(Bullseye)*	$23
28612	GATO *(Spectrum Holobyte)*	$25
28642	Gauntlet *(Mindscape)*	$28
28688	Hardball *(Accolade)*	$25
28618	Hidden Agenda *(Springboard)*	$35
28620	JET *(SubLogic)*	$31
28724	Kings Quest 1 *(Sierra-On Line)*	$28
28726	Kings Quest 2 *(Sierra-On Line)*	$28
28728	Kings Quest 3 *(Sierra-On Line)*	$28
28714	Leisure Suit Larry 1 *(Sierra-On Line)*	$23
28658	Life & Death *(Electronic Arts)*	$31
28624	Lunar Rescue *(XOR)*	$32
28730	Mac Wizardry *(Sir-Tech)*	$34
28708	MacGolf *(PCAI)*	$33

Just for the Fun of It (Games) *(continued)*

28628	MacGolf Classic *(XOR)*	$51
28722	Man Hunter NY *(Sierra-On Line)*	$28
28696	Manhole *(Activision)*	$28
28698	Manhole (CD ROM) *(Activision)*	$34
28690	Mean 18 *(Accolade)*	$25
28630	NFL Challenge *(XOR)*	$53
28686	P51 Mustang Flight Simulator *(Bullseye)*	$32
28720	Police Quest 1 *(Sierra-On Line)*	$28
28610	PT-109 *(Spectrum Holobyte)*	$25
28694	Quarterstaff *(Activision)*	$30
28652	Reach for the Stars *(Electronic Arts)*	$25
28626	Road Racer *(XOR)*	$39
28616	Sargon IV *(Spinnaker)*	$29
28640	Shadowgate *(Mindscape)*	$28
28666	Shufflepuck Cafe *(Broderbund)*	$22
28678	SimCity *(Broderbund)*	$28
28680	SimCity Supreme *(Broderbund)*	$47
28710	SpaceQuest *(Sierra-On Line)*	$28
28712	SpaceQuest II *(Sierra-On Line)*	$28
28664	Star Wars *(Broderbund)*	$23
28622	TaskMaker *(XOR)*	$26
28606	Tetris *(Spectrum Holobyte)*	$18
28608	Tetris—Color Version *(Spectrum Holobyte)*	$21
28660	Hunt for Red October *(Software Toolworks)*	$31
28644	Uninvited *(Mindscape)*	$28
28604	Welltris *(Spectrum Holobyte)*	$19
28672	Where/ Carmen Sandiego *(Broderbund)*	$28
28674	Where/Europe Carmen *(Broderbund)*	$28
28676	Where/USA Carmen *(Broderbund)*	$28
28662	Starfleet *(Electronic Arts)*	$35

Music & Sound

27998	ConcertWare + MIDI *(Great Wave)*	$98
27960	Jam Session *(Broderbund)*	$29
27978	SmoothTalker *(Byte)*	$31

The Graphic Arts

Mostly Drawing

29232	Canvas *(Deneba Software)*	$186
29206	ClarisCAD 1.0 *(Claris)*	$589
29234	Cricket Draw *(Cricket)*	$169
29238	Dreams 1.1 *(Innovative Data Design)*	$315
29784	Freehand 2.0 *(Aldus)*	$326
29788	Illustrator 88 *(Adobe)*	$275
29240	MacDraft *(Innovative Data Design)*	$167
29204	MacDraw II 1.1 w/ ATM *(Claris)*	$291
29222	SuperPaint *(Silicon Beach)*	$129

Mostly Painting

29236	Cricket Paint *(Cricket)*	$176
29202	MacPaint II 2.0 *(Claris)*	$94
29228	PixelPaint *(Supermac)*	$223
29230	PixelPaint Pro *(Supermac)*	$387

Mostly Graphics Editing

29224	Digital Darkroom *(Silicon Beach)*	$260
29790	ImageStudio *(Letraset)*	$273
29218	Model Shop *(Paracomp)*	$378
29266	Photoshop *(Adobe)*	$498
29242	Studio/1 *(Electronic Arts)*	$95
29244	Studio/8 *(Electronic Arts)*	$295
29226	Super3D *(Silicon Beach)*	$313
29220	Swivel 3D *(Paracomp)*	$294
29212	Videoworks II Accelerator *(Macromind)*	$119
29210	Videoworks II Hypercard *(Macromind)*	$60

Graph & Chart Makers

29806	Cricket Graph 1.3 *(Cricket)*	$113
29260	DeltaGraph *(DeltaPoint)*	$97

Presentation Managers

29258	Accelerator *(Macromind)*	$124
29804	Cricket Presents 2.0 *(Cricket)*	$283
29216	Director *(Macromind)*	$436
29782	Persuasion *(Aldus)*	$327
29798	PowerPoint 2.01 *(Microsoft)*	$246

Certificate & Award Generators

29810	Certificate Library *(Springboard)*	$17
29808	Certificate Maker *(Springboard)*	$21
29812	Top Honors *(Springboard)*	$57

Graphic Utilities, etc.

29794	LetraStudio *(Letraset)*	$273
29264	Curator *(Solutions Int'l)*	$71
30380	SmartScrap & Clipper *(Solutions Int'l)*	$45

Graphic Art Collections

29252	Click Art Business *(TiMaker)*	$32
29256	Click Art Christian *(TiMaker)*	$37
29254	Click Art Holidays *(TiMaker)*	$32
29818	EPS Business Art *(TiMaker)*	$82
29816	EPS Illustrations *(TiMaker)*	$83
29246	Smart Art 1 *(Adobe)*	$83
29248	Smart Art 2 *(Adobe)*	$83
29250	Smart Art 3 *(Adobe)*	$83

Optical Character Recognition

30610	OmniPage 2.0 *(Caere)*	$535

Do It Yourself Programming

30426	101 Scripts&Buttons *(Individual Software)*	$35
27582	Just Enough Pascal *(Symantec)*	$46
27588	Prototyper *(Smethers Barnes)*	$183
27590	QuickBasic *(MicroSoft)*	$64
27580	Supercard *(Silicon Beach)*	$127
27586	THINK C *(Symantec)*	$163
27584	THINK Pascal v3.0 *(Symantec)*	$160
30416	TMON *(Icom Simulation)*	$87
27592	Turbo Pascal *(Borland)*	$67

Safety, Maintenance & Repair Utilities

Data Organization

30354	DiskTop 4.0 *(CE Software)*	$63
30434	On Location *(On Technologies)*	$75
30402	Suitcase II *(Fifth Generation)*	$43

Data Storage Management & Repair

30420	Complete Undelete *(1st Aid Software)*	$36
30362	Copy II Mac *(Central Point)*	$22
30410	Disk Tools Plus *(Electronic Arts)*	$31
30422	DiskExpress II 2.0 *(ALSOFT)*	$54
30392	DiskFit *(SuperMac Software)*	$58
30404	FastBack *(Fifth Generation)*	$106
30375	INITPicker *(Microseeds Publishing)*	$39
30364	Mac Tools 1.0 *(Central Point)*	$43
30394	Network DiskFit *(SuperMac Software)*	$223
30436	Norton Util/Mac *(Norton Utilities)*	$79
30378	Redux *(Microseeds Publishing)*	$51
30384	Retrospect *(Dantz Development)*	$152
30340	Sum II *(Symantec)*	$92
30344	xTree Mac *(xTree)*	$52

Shortcut & Time Saving Utilities

30348	CanOpener *(Abbott Systems)*	$63
30430	Clip Share 1.0 *(Olduvai)*	$138
30388	LaserSpool *(SuperMac)*	$87
30390	LaserSpool 5-Pack *(SuperMac)*	$286
30428	MacPrint 1.1 *(Insight Development)*	$94
30360	MockPackage Plus Util. *(CE Software)*	$30
30408	On Cue *(Icom Simulations)*	$35
30400	PowerStation *(Fifth Generation)*	$33
30356	QuickKeys *(CE Software)*	$62
30418	Shortcut *(Alladdin)*	$45
30382	SuperGlue *(Solutions Int'l)*	$61
30386	SuperSpool *(SuperMac)*	$58
30352	Tempo II *(Affinity Microsystems)*	$97

Data Security Utilities

30406	DiskLock *(Fifth Generation)*	$106
30370	MacSafe II *(Kent marsh LTD)*	$105
30366	QuickLock v1.0 *(Kent marsh LTD)*	$55
30396	Sentinal *(Supermac)*	$86
30368	The Night Watch v1.03 *(Kent marsh LTD)*	$85

Screen Saver Utilities

30424	After Dark *(Berkley Systems)*	$24
30399	Pyro *(Fifth Generation)*	$21

Virus Detectors & Eradicators

30342	SAM *(Symantec)*	$63
30413	Virex *(HJC Software)*	$51
30414	Virex (10 Pack) *(HJC Software)*	$346

Other Utilities

30350	Affinifile *(Affinity Microsystems)*	$44
30376	Screen Gems *(Microseeds Publishing)*	$39

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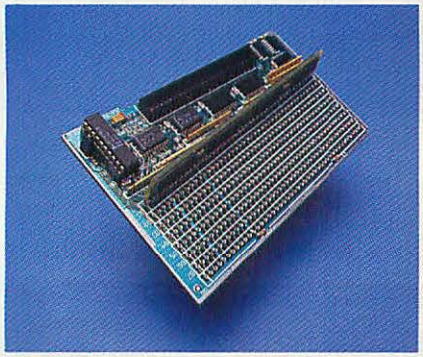
2 x 1MB SIMMs (80ns)	*25480*—$138
4 x 1MB SIMMs (80ns)	*25842*—$276



Portable RAM

This expansion board uses the expansion slot of your Mac Portable to give you the RAM you need for powerful applications. And, even though it gives you all the power you need, this board prolongs your battery life because of its low power requirements and a sleep mode that operates at a ridiculously low 3-4 milliAMPs. You'll have the option to continue expanding your Portable's RAM in 1MB increments without blocking other Mac Portable slots.

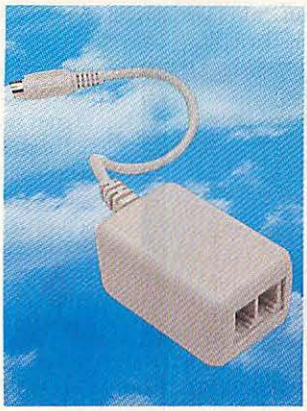
Applied Engineering 1MB expansion card	*25487*—$535

Network

Who Put the NET in Network?

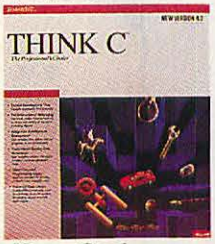
When someone is talking about a Macintosh network, they're talking about Farallon PhoneNET connectors. You can't have a network without them. And it's better to have a few extras on hand because there's always someone else who wants to get connected.

PhoneNET Din-8	*22513*—$31
PhoneNET DB-9	*22511*—$34
PhoneNET 10-Pack	*22534*—$215



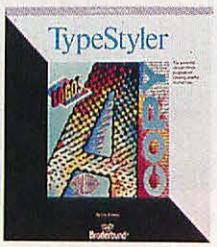
Software

A Language Everyone Understands



Think C's fast compiler and linker shrink programming time. Devise new applications, DAs, INITs, drivers or HyperCard functions in Think C's powerful but flexible programming environment.

THINK C 4.0	*27586*—$163

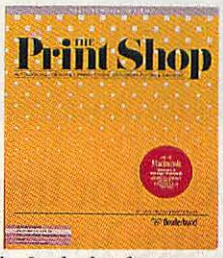


Playing With Type

BroderBund's TypeStyler is a handy typographical utility that gives you the power to create display type from the usual typefaces. The TypeStyler Package includes 10 typefaces. Supports 8-bit color and lets you output process color separations.

Broderbund TypeStyler	*30450*—$115

Special Printing Effects



A convenient program designed to print greeting cards, signs or other special displays from your Macintosh. Includes fonts, clip art and decorative borders to dress up the images.

Broderbund Print Shop	*29836*—$35

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Input

Configure It Out Yourself

The new SwitchBoard from DataDesk gives you the option to configure your keyboard just as you've always wanted it to be. Rearrange the keyboard, cursor keys and numeric keypad. Or add the optional SwitchBall and function key modules to complete your data input options.

SwitchBoard	*25182*—$174
SwitchBall	*25183*—$115
15-function key module	*25184*—$37

Turbo Powered Mouse

If you're looking for a mousing alternative, join the thousands of Mac users who've chosen the Kensington Turbo Mouse. One of the most popular trackballs on the market, it senses your movements and adjusts cursor speed while giving you precise cursor control.

Kensington Turbo Mouse ADB	*25281*—$167

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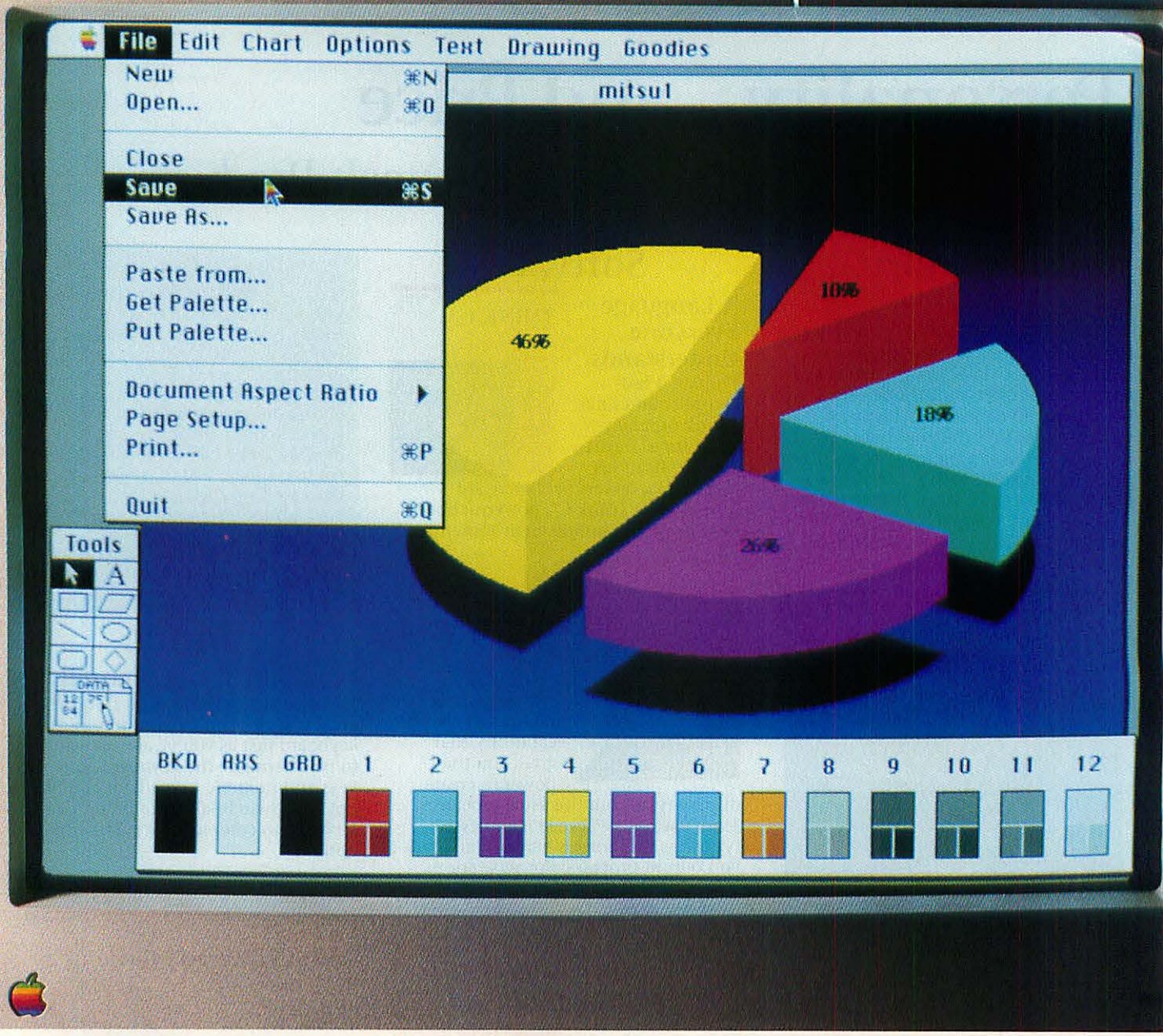

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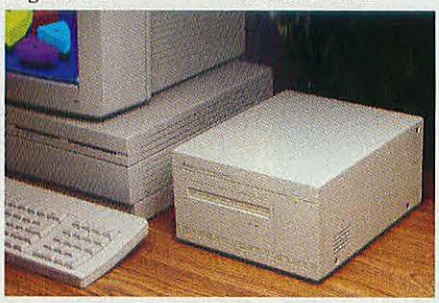

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Circle 52 on reader service card

The Vise of Progress

USERS ARE SQUEEZED BY INCOMPATIBILITY ISSUES AS APPLE PUSHES NEW TECHNOLOGY

BY BRUCE F. WEBSTER

My first inkling that there were problems with the Macintosh IIci came late last year. I was trying to send an article to *Macworld* using AppleLink 4.0. I had no problem launching AppleLink, no problem connecting, no problem setting up a file transfer. When I tried to carry out the actual transfer, however, the entire system froze up and I had to restart. Multiple attempts produced identical symptoms. Since the same copy of AppleLink 4.0 had worked just fine on both a Mac IIx and a Mac SE, I had reason to suspect the IIci. An upgrade to AppleLink 5.0 solved the problem, but that was my first clue that not all was well with the Macintosh IIci.

Lots of other clues followed. Complaints were surfacing on various teleconferencing systems about NuBus boards not working, about software crashing, about discovering problems with external hard drives. Certain hardware and software developers tried to figure out what was going wrong, initially without much help from Apple. Finally, some six months after the IIci started shipping, Apple issued a technical report called *The Price of Progress* that documented the technical causes—if not the reasons behind them—for the Mac IIci incompatibilities.

Those problems present a microcosm of all the issues surrounding the costs of change: technology trade-offs, lack of adequate information, as well as actual mistakes. Since similar problems may very well appear in the future, it is worth taking a look at what happened and how such situations might be avoided.

Getting Bussed

The first sign of problems with the IIci came when users installed certain NuBus boards in their new machines, only to find that the boards did not work. Many owners thought the boards were at fault, prompting lots of tech-support calls and boards returned to dealers and manufacturers. Generally, the boards tested out fine and worked well in other Mac models (II, IIx, IIcx). The manufacturers then called Macintosh Developer Technical Support (MacDTS) at Apple for clues, but were told initially that there were no known problems with the IIci.

Developers say that when they did their own research, they discovered that Apple had started using the paged memory management unit (PMMU) built into the Mac IIci's 68030 processor. The PMMU maps logical memory addresses (the addresses used by the toolbox, the Operating System, and applications) onto physical memory addresses (the actual hardware addresses of the RAM installed in the machine). Even though other systems—the Mac IIx and IIcx—used the 68030 processor as a CPU, neither the Operating System nor the hardware configuration had required use of the PMMU, and the logical and physical addresses always matched exactly (with some help from the main logic board). But that changed with the Mac IIci and its built-in video circuitry.

Apple started using the PMMU to remap the section of main memory used for built-in video to make it look as though the built-in video occupied the same address space as a NuBus video board. That let the system and application software treat the built-in video as just another video board.

Unfortunately, this also wreaked havoc with any NuBus board that attempted to perform a Bus Master transfer, that is, a data transfer controlled and performed by the NuBus board itself instead of by the system's CPU. Why? Because the NuBus board controlling the transfer needs to know the physical addresses involved in the transfer, not just the logical addresses. On earlier systems, this was no problem: the logical and physical addresses were identical. On the IIci, though, there were no such guarantees, and systems would crash or freeze when a transfer was attempted.

Even after the problem was identified, Apple was not a great deal of help to affected developers. One firm whose NuBus boards wouldn't work in the IIci asked MacDTS what to do;

(continues)

the reply (which the developers say they still have as an AppleLink memo) was "I refer you to the MC68030 User's Manual and wish you luck."

What the developers needed wasn't luck; it was some means to translate logical addresses into physical ones. Such a function, called GetPhysical, was planned for System 7.0, but that was of no help at that moment. And yet Apple itself was able to get around the problem. A few months after the Mac IIci started shipping, the developers found out how: there was an undocumented function in the IIci's ROM that performed the memory translation. As the developers learned about this, they were able to create new firmware and drivers for their NuBus boards, making them compatible with the IIci.

Clean versus Dirty

Software manufacturers didn't escape the impact of the PMMU's use, either. But in this case, the developers themselves were to blame. Prior to the introduction of the Macintosh IIci, developers could get away with "dirty" addresses; that is, with addresses outside of the available logical address space. The Macintosh would just ignore any extraneous bits and resolve the address as a legal one. This allowed programmers to store information in those extra bits or (for the less clever) just to be sloppy as to how address values were calculated.

However, with the PMMU active, all addresses were considered valid; the PMMU would make a valiant effort to convert the logical address requested into a physical address. Illegal addresses caused programs to crash on the IIci. The developers couldn't complain; for a long time Apple had stressed the need for applications to be "32-bit clean," meaning that all addresses are formulated as valid 32-bit addresses. Of course, that didn't spare Apple the embarrassment of having some of its own applications crash on the IIci, including its CD ROM driver (version 3.0), MacTerminal (version 2.3), and the aforementioned AppleLink (version 4.0).

A similar problem occurred with 32-bit QuickDraw. Until the release of the IIci, 32-bit QuickDraw was present as system software loaded into RAM; applications and video boards could detect and disable it if they weren't yet compatible with it, using the older QuickDraw stored in ROM. However, the Mac IIci has 32-bit QuickDraw in ROM; there is no other option for products not yet compatible and no way to disable 32-bit QuickDraw. Again, Apple was hoist with its own petard: HyperCard had to be revised for IIci compatibility, which is why version 1.2.5 of HyperCard was developed and released with the Mac IIci.

Another, smaller source of problems was the increase to a 25MHz clock cycle. The last increase in clock speed had been two years earlier, when the 16MHz Mac II was introduced. Subsequent models—the Mac IIx, SE/30, and IIcx—all ran at 16MHz as well. Because of this, some developers (particularly some game develop-

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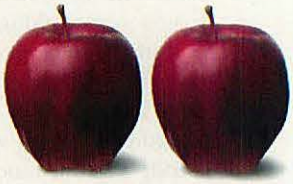

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ers) had written code that was time-critical and that assumed a 16MHz clock rate. The jump to 25MHz caused problems with such code.

Thanks to these and a few similar issues, the Mac IIci forced developers (including Apple) to clean up their software, steps they needed to take and that Apple had recommended for quite some time. In the long run, this is good for all parties involved. In the short run, though, it can be painful. Apple gets criticism and hostility for problems that aren't completely the company's fault. Developers get swamped with tech-support calls and have to invest time, money, and personnel to upgrade their products. Users find that off-the-shelf third-party software and hardware doesn't work; they either have to pay for upgrades or not use the products at all.

Bugged ROMs

Not all of the IIci's problems resulted from advancing technology; some were just out-and-out errors on Apple's part. One source of headaches for both users and developers was a set of bugs introduced in the Mac IIci ROM, bugs that did not exist in previous ROMs.

Apple claims that most of the bugs cause only cosmetic problems because they affect how things look on the screen and not functionality per se. These include problems selecting the color palette for a launched application, drawing zero-width characters, and editing text. However, since some of the strong selling points of the Macintosh include its visual presentation and use in desktop publishing, even "cosmetic" bugs are serious. Also, a not-so-cosmetic bug in the serial drive code can cause the system to crash if a BRK (break) character is received during serial communications.

Apple says that these bugs were fixed in the release of System 6.0.5. Some users have been wary of upgrading to System 6.0.5 because of reports of bugs introduced in *that* release. But IIci owners will probably find that the cure is, indeed, better than the disease.

Sins of the Fathers

Was the Macintosh IIci an anomaly, a confluence of technological advances, bad luck, and poor judgment? Perhaps; the Mac IIfx, which also pushed some new hardware limits, doesn't have quite the same reputation for bugs and compatibility problems. However, as some developers point out, the fixes they put in for the Mac IIci prevented similar problems with the Mac IIfx.

Still, the IIfx has its own unique quirks. For example, the black SCSI terminators needed for the IIfx are different from the gray ones for other Apple systems; one consultant claims that two gray terminators equal one black terminator. (Users unaware of the differences may encounter problems getting SCSI devices to work if they use the wrong terminators.) The IIfx slows down when running on AppleShare networks, due to excess polling. And while Apple has released a list of software tested with the IIfx

(continues)

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DATA RECOVERY	✓	✓					
Selective/intelligent search	✓						
Pause & view during undelete	✓						
Recover files in-place	✓						
OPTIMIZER	✓	✓			✓		
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DATA PROTECTION	✓	✓					
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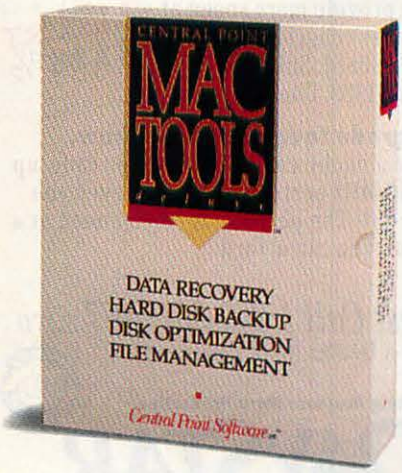

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and judged compatible, those tests are, by Apple's own admission, rather simple. As one source puts it, there's a big difference between doing a quick launch/load/modify/save test of an application and wrestling with a 20MB TIFF file within QuarkXPress.

One firm that specializes in selling and supporting high-end Macintosh systems has pretty much stopped offering the IIci and IIfx because of support costs; one official has commented that the firm was losing money solving Apple's design problems. Instead, he installs DayStar 50MHz 68030 accelerators into Mac IIx and IIcx platforms, claiming those configurations are more reliable and compatible than the IIci or IIfx. In light of that, it's interesting to note Apple's recent ad campaign promoting the IIci over the IIcx, an indication that IIci sales may not be meeting expectations.

Caught in the Squeeze

There are costs for progress. The Macintosh architecture is nearly seven years old, and it's increasingly difficult for Apple to advance the technology without breaking existing products, including its own. The problems introduced with the Mac IIci and IIfx can be considered a preview to the truly major challenges facing developers and users with the advent of System 7.0, not to mention any surprises that might surface with any new CPUs. Indeed, one wag at last April's Macworld Expo was wearing a T-shirt that read, "I'm waiting for System 7.0.1."

But there are also ways to minimize those costs to developers and thus to users. One is to provide adequate developer technical support. Concerns have been raised by some developers, particularly original-equipment manufacturers, over Apple's recent cuts in the OEM group at MacDTS. And, of course, the entire fiasco with the PMMU problem on the IIci indicates that somehow vital information is not getting from Apple Engineering to MacDTS.

A second means is to provide solid information. Developers clearly need access to the data (not to mention actual hardware and software) vital to maintaining compatibility with new platforms. One source claims that some developers who requested prerelease Mac IIfx systems got instead modified Mac IIs with IIfx-like ROM—and then ran into serious compatibility problems when the actual Mac IIfx was released. Another source talks about how his firm just accepts as a matter of course that there will be sufficient differences between the final beta ROM version of any new machine and the actual released ROM version to introduce new bugs.

Another approach is to provide sufficient quality-assurance (QA) testing on new products. Unfortunately, the complexity of Mac system software has reached the point where exhaustive testing is impossible; there are just too many variables involved. But the rash of bugs in the Mac IIci's ROM indicate a failure in QA at some point, either in testing or in code maintenance. Apple's best solution here may be to build in an automatic four-week delay between introduction and shipping of any new hardware platform, allowing time for those last few wrinkles to be detected and ironed out.

To Apple's credit, it is attempting such measures with System 7.0. Despite the sniping, I see nothing wrong with Apple's postponing System 7.0's release date. First, developers need the time to do the significant development and testing required for their new and existing products to work with System 7.0. Second, Apple needs to carefully think through the implications of each design feature and implementation and to nail down all the System 7.0 bugs it can.

For users, though, the challenges will not go away—and it is, in part, their own fault. The constant market demands for bigger, better, faster systems lead to the very problems described here. The result is a broad spectrum of platforms and products, with few clear guides as to what combinations are compatible with one another and no guarantees that existing products will work on future platforms. As a result, it is the users who are ultimately caught in the vise of progress. M

Contributing editor Bruce F. Webster is vice president of R&D at San Diego–based Pages, Inc. He can be reached via BIX (bwebster) and via MCI Mail (Bruce Webster).

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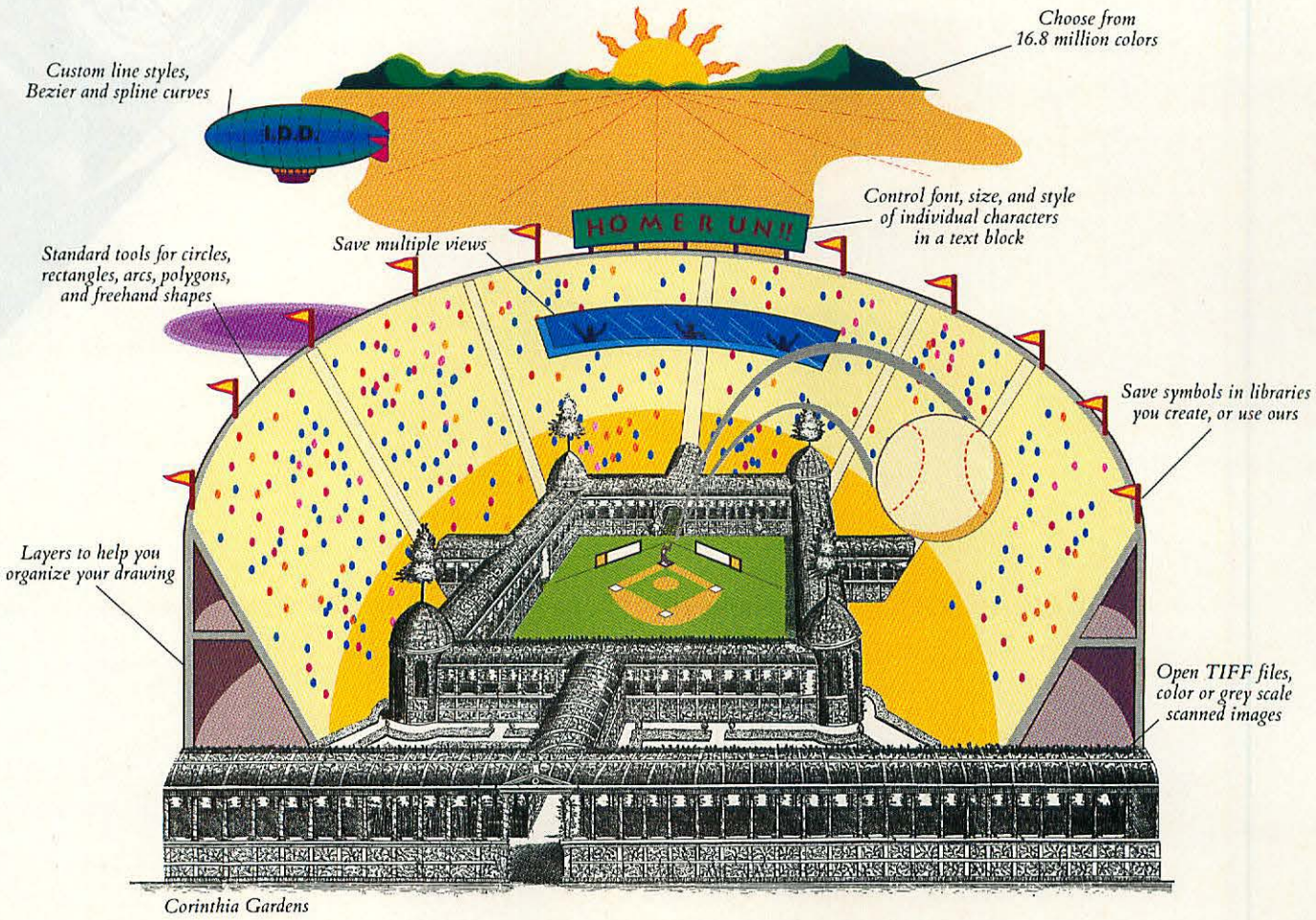

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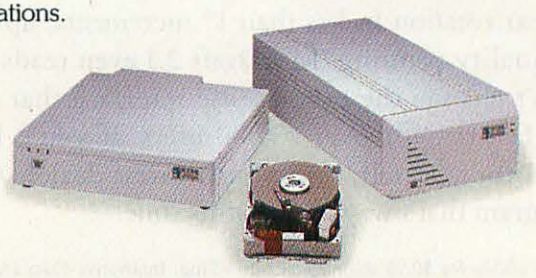

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An Interview with Kieth Sorenson, President and Founder of RasterOps Corporation

BY JERRY BORRELL

Kieth Sorenson was born in Los Angeles and raised in Minneapolis. He went to San Jose State University, where he received a B.A. in mathematics. In 1964 he joined the navy as a radar crewman on P3 intelligence planes. After leaving the navy in 1968, he spent two years working for United Airlines and began designing test equipment. From 1972 to 1978 he integrated aircraft instrument and display systems with computers for NASA. While at NASA he began working with Evans & Sutherland flight-simulation computers, embedding graphics panels into instrument displays for flight simulators. In 1978 he joined Singer Link, designing out-of-window simulation displays. In 1979 he joined a near-legendary Silicon Valley firm, Ramtek, the first large-scale builder of computer imaging and display systems for minicomputers. In 1987 Sorenson founded RasterOps, which in May of this year became a public offering. Today the company has annual revenues in excess of $60 million and employs 135 people.

MW Your company came out of left field to become one of the most successful developers in the Macintosh community. How?

SORENSON Try . . . luck? Being prepared in the face of an opportunity? We knew what we were doing. It just so happened that the Macintosh is a successful product and we capitalized on that.

MW Until recently, RasterOps was the only third-party developer in the Mac community to be a public company.

SORENSON Well, unless you count Mass Microsystems. But they went out in the Pennsylvania market and not with a Wall Street firm. They needed the capital. So if you ignore that anomaly, yes. However, Radius has just gone public.

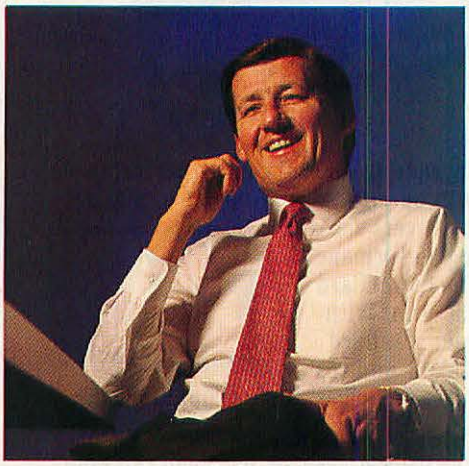
There were about seven or eight large investment banks that wanted to take us public. They kept after us, trying to keep up with our progress. When RasterOps made the decision to go public, I chose two large firms—Donaldson, Lufkin, Jenrette and Robertson Stephens Company. Robertson did a fantastic job with the prospectus and the offering.

MW Did you make a few millionaires in the process?

SORENSON Yes. On paper. But people like me, principals, can only sell a small percentage of their stock per quarter. There are two key rules for public offerings. Rule 44 says that you can't buy and sell stock in any six-month period. So officers with stock options that they purchased can't sell for six months. Rule 16B says you can't sell founder stock for two years. Because it's hard to sell and it's government regulated, it makes millionaires on paper only. We have a couple of guys here with 100,000 shares of stock, but they can't sell it. It's not like Apple where you have 100 million shares of stock out there.

MW What do you think of Radius's public offering?

SORENSON They didn't get our multiples, so it was probably something of



DAVID MENDEZ

a humbling experience. They were priced 11 to 13, went out at 10 and traded down, so they didn't get our multiples.

MW Why?

SORENSON The market values technology more than marketing. There were other factors. The whole stock market is down. They were priced the same as us, but they went down and we didn't.

MW How do you compare in size to other companies selling graphics products in the Mac market?

SORENSON SuperMac is near our size, but about 30 percent of their revenues are in disk drives and 10 percent in software. Overall we're first in color displays, with SuperMac second and E-Machines third. In monochrome, first you have Radius and then E-Machines.

MW The market is going to get even tougher when Apple announces its

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SORENSON We'll have to compete as we do today. We have some of the same products as Apple does, but Apple takes market share; their logo on products has clout. We have products coming that up the ante. Our goal is to always be one year ahead of Apple in display technology.

And there are a lot of other products out there. Radius has Radius TV. SuperMac said they were not interested in video, but recently announced they will have video products.

MW Why is video becoming so hot in the market?

SORENSON Video, graphics, imaging are all part of display technology and they're all migrating to computer technology.

MW You were the first company in the market with a low-cost 24-bit board. Does it still sell?

SORENSON Yes, very well. We've got about 20,000 of them in the market now.

One talented guy doing the designs is much faster than a mediocre team. We don't have any junior positions

MW RasterOps also builds and sells video boards for the PC and for Sun Microsystems' microcomputers.

SORENSON Our business plan called for us to build cards for Sun machines, but the Mac products were so successful that we didn't get around to it for a year. We hadn't anticipated the growth of the Mac market. We finally got the Sun product out for the 386i about the time that machine was dying. Then SPARC [architecture] machines became the thing and we modified our board for the SPARC workstation. It's not a great revenue generator. There isn't much color software developed for the SPARC machine yet.

MW What about Windows on DOS?

SORENSON We have the first 24-bit card for IBM PCs running Windows 3.0.

MW How do you keep up with software development, when you are primarily a hardware-development company?

SORENSON We run engineering the way I like it. We build products by hiring talented individuals and giving them support staff. One talented guy doing the designs is much faster than a mediocre team. We have an engineering staff of only 20. We write all the software we use. We don't have any junior positions, so we have only one hardware guy and one software guy for each project. Our IBM project broke that mold for us. We had one guy on the hardware, one on Presentation Manager, and one on Windows 3.0. We have about four guys on software and four or five engineers on hardware for the Macintosh.

MW What is the direction for graphics software on the Mac?

SORENSON That's an interesting question that illustrates our philosophy. Basically we don't believe in graphics coprocessors. We have acceleration—essentially it's a bit-blit engine. I believe that future workstations will run RISC, or RISC-like, processors running fast display buffers with real-time video in and out.

The question we face as a developer is whether Adobe or Aldus will rewrite their software to take advantage of acceleration techniques. They won't do it. If they did, by the time they had changed their software to

(continues)

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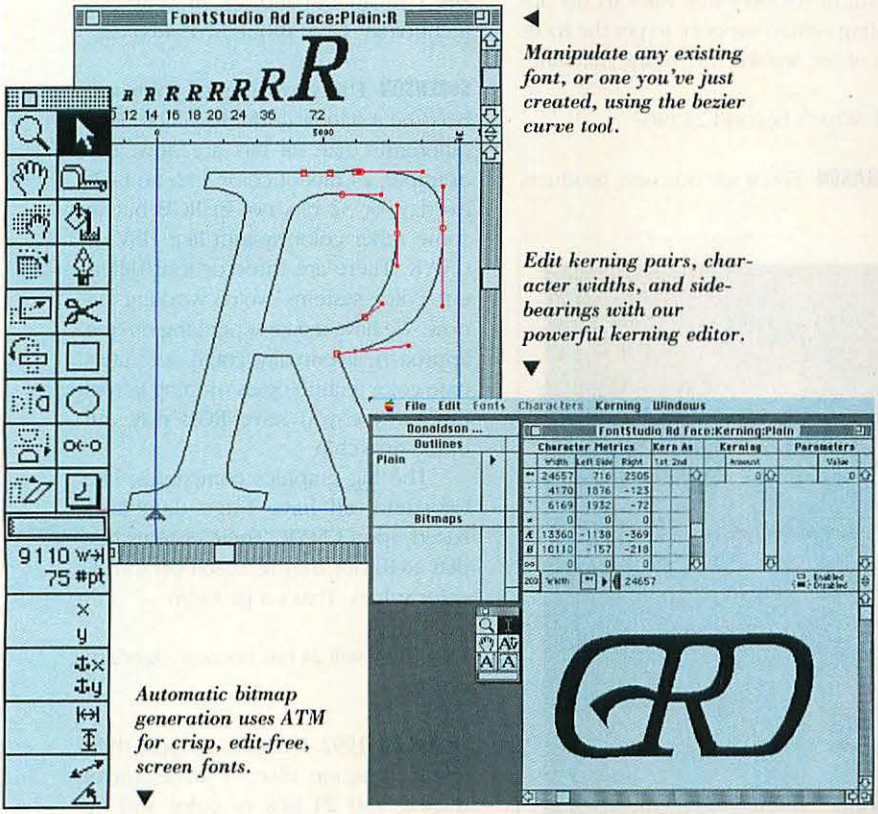

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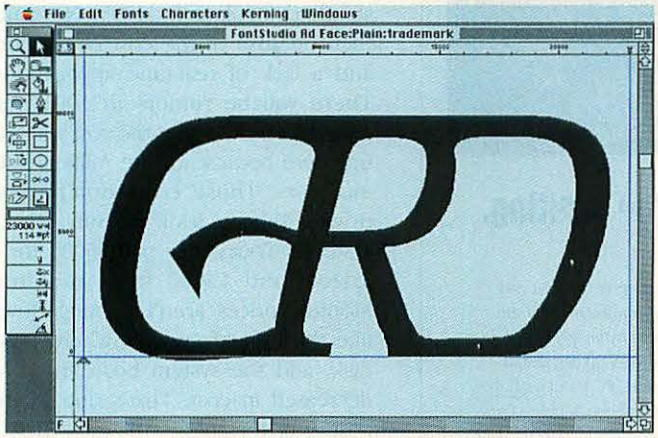

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take advantage of a graphics accelerator, Apple or Sun would have built a workstation twice as fast.

So we build the lowest-cost, highest-performance frame buffers possible, with the highest bus performance and fewest wait states. Two times the performance of the current Apple card.

MW Why won't accelerators work?

SORENSON They're not transparent to the software. I don't think developers will ever want to take advantage of them; developers just want to do operating system support, to get the most out of the architecture of the machine.

MW What's beyond 24 bits?

SORENSON You'll see our next products in early 1991. For all those guys playing catch-up with us, it's over for them.

MW I mean beyond 24-bit graphics technology. How about 32 or 48 bits?

SORENSON Thirty-two bits of color will become a standard. But it will be used differently than 24 bits are now. For example, 24 bits of color with an 8-bit overlay, or 32 bits not in RGB but in some other color system like HSV or CMYK. There are three or four different color systems we're working on now. We have a patent pending on one approach. Eventually you'll see alternate color technologies running in real time where you have RGB now, all based on a chip.

The big graphics companies, like Crosfield, all have huge databases based upon CMYK. Their systems display RGB but they're based on CMYK color values. That's a problem.

MW When will 24 bits become standard on PCs?

SORENSON 1992. If not from Apple then from someone else. A 1-megapixel display and 24 bits of color will be standard for sure by 1993. Not until then because of the cost of memory and a lack of real-time applications. There will be rumors in 1991, but nothing will ship. And the cost will stay up there because of the million-pixel monitors. Those costs don't come down. Take a look at Sun Microsystems. Today you pay $5000 for a system and $4000 for a monitor. Monitor prices aren't coming down like the cost of systems where RAM, disk, and the system board have all decreased in cost. That's due to the cost of high-resolution 19-inch CRTs.

MW Will we ever have or need 48-bit graphics?

SORENSON There will be uses in the film industry and other specialized applications. Mostly people want more pixel density, not more colors. They want more pixels on the screen, not more bits of memory for color.

The Apple model already allows for 48 bits of color. Color QuickDraw has that capability, but Apple hasn't

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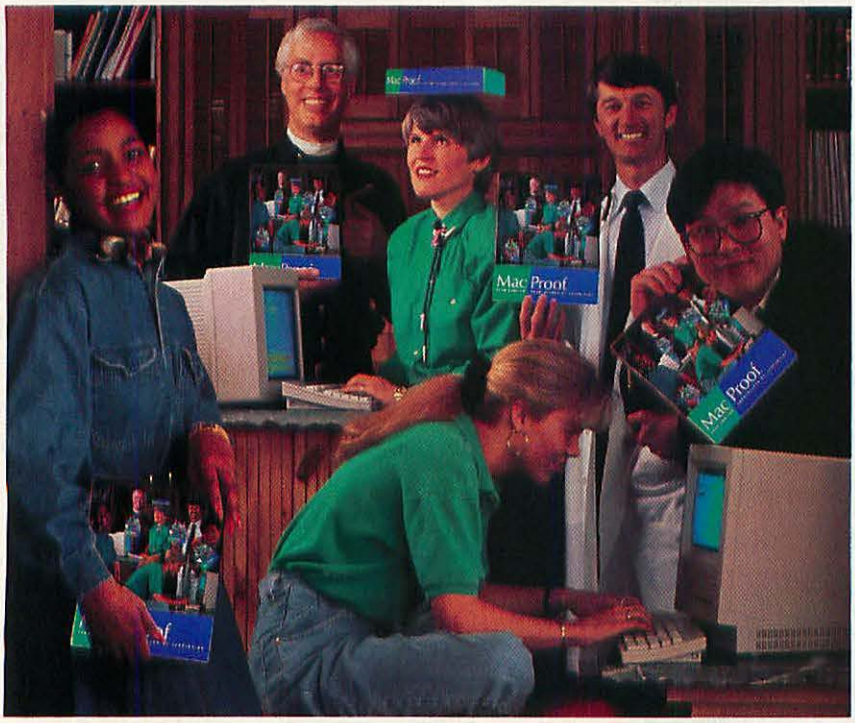

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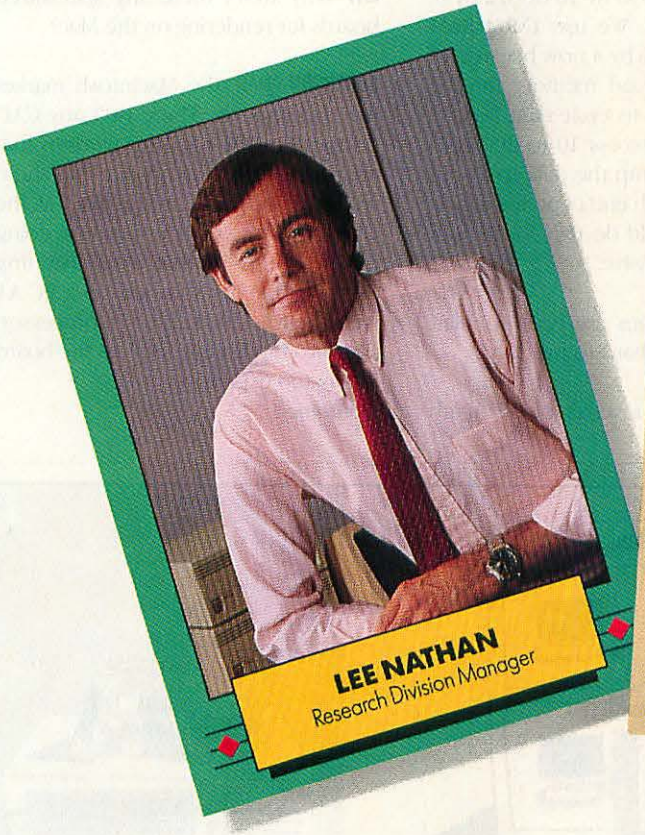

LEE NATHAN
Research Division Manager

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built that capability into the monitor cdev in the control panel. Two to the 48th power is a lot of color. You might need it for a database, and for things like film recorders, but not for display. You can't see that many colors on a 19-inch screen. If you take the color red and ramp it over the space of a 19-inch monitor, you'll see bands of color with an 8-bit display, but not with a 24-bit display.

MW What is the issue with RAM, or memory, for graphics uses?

SORENSON Cost is the big issue. Video RAM, triple-ported RAM for use in real-time multiple window displays, is what's coming.

In terms of the chips, 1-megabit VRAM chips are down to $12. So an 8-bit graphics card requires $96 in VRAM. You can't do any better than that price. The Japanese [suppliers of these RAM parts] don't think about business like we do. If you buy 100,000 RAM chips at discount for $12 apiece and switch to ordering 5 million parts, you might get a price of $11.85. You'd have a good working relationship so, if the market dried up, you'd be supplied—but the Japanese get their price.

MW What about 4Mbit RAMs? Will they make a difference for Mac graphics?

SORENSON The 4Mbit memories are more important for the microprocessor. We need a 4-Mbit chip with [an architecture of] 256 by 16 or 512 by 8. More parallelism. We use 1Mbit RAM configured as 256 by 4 now because of the need to unload memory for the screen. We have to cycle data fast for the screen. We access 10 to 20 RAMs at a time and dump the data to a shift register at the high end of performance. Static RAMs would do that for us, but they're too expensive.

MW Shaded images are very popular. Why are they so hard to produce?

SORENSON That's a result of the math it takes to calculate the incidence of the light falling on an object and returning to the eye. When you're building an object for rendering or when you're synthesizing an object, the problem is not with the frame buffer—that is, the graphics or video board—but with the math. That's why ray tracing looks so good, because you calculate a value for every picture element on the screen.

MW Why aren't there any specialized boards for rendering on the Mac?

SORENSON Well, the Macintosh market isn't big enough. There isn't any CAD on the Mac. We tried [to work in that area] but there was no market. There will be more [CAD on the Mac] as the CPUs run faster. Truevision is doing development in that area, running Pixar's rendering software on a PC AT with the Intel i860 graphics processor. But the chip itself is $800 so the board is way too expensive.

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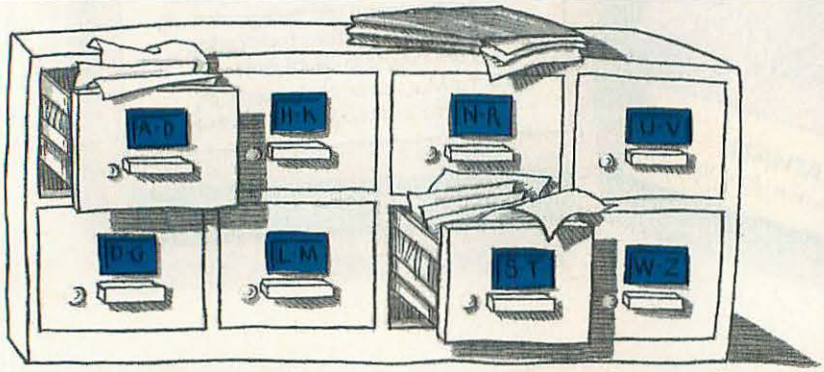

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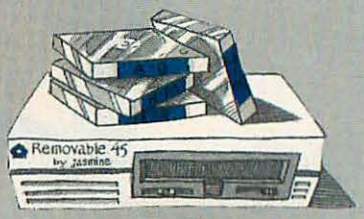

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MINI PICS™ (IC): mini-pics
MISTRAL: Mistral
ITC MIXAGE®: Mixage book · Mixage book italic · Mixage bold · Mixage bold italic · Mixage black · Mixage black italic
ITC MODERN NO. 216®: Modern no. 216 light · Modern no. 216 light italic · Modern no. 216 bold · Modern no. 216 bold italic

Modern no. 216 heavy · Modern no. 216 italic
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NEON™ (IC): NEON
ITC NEON®: ITC NEON
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Panache ... · Panache bold italic
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ITC PIONEER®: PIONEER
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MW The 68000-processor family won't support the kind of work you're talking about?

SORENSON Motorola can introduce faster CPU chips and Apple will benefit as Motorola pushes its chips faster. But ray tracing will never be realized without massive parallelism, and the market is too small for that on the Mac.

MW Your company introduced the 264 board, which was the first product to bring 24-bit color to the personal computer for under $1000.

SORENSON Yes. It still generates great revenue but Jean-Louis Gassée said at one time that we don't get a standard gross margin on that product. And other people say the same thing—we can't make a profit on the 264; we use it as a loss leader. But despite what they say, we do. All our VLSI on that board costs less than a 1MB RAM chip. We're selling that board for around $750. If Apple or other companies can't make a similar margin on their products, maybe they'd better fire their procurement managers.

MW It only works with the Apple 13-inch monitor?

SORENSON Yes. It's a volume product. We shipped 3000 in the first month. It's still the largest seller in the market. SuperMac had a low-cost product, which we seldom hear about anymore. They can't compete with us on cost.

MW Apple has a low-cost color board.

SORENSON It was announced at $1195, but then they dropped the price down to $995. It's amazing, Apple lowering its prices in response to us. We even have a lower-priced solution, which allows people to buy the 264 board populated with RAM for 8 bits and then buy [cheaper] RAM elsewhere to upgrade the board.

MW How do you define multimedia?

SORENSON We break multimedia into small parts, defining it as a computer and television—taking TV into the computer and, in the future, taking the computer out to the TV. Right now people want to use their VCR, TV, or laserdisc to display information on their computer—something our 364 board allows them to do.

There's a lot of interest in the subject today but practically no software. MacroMind's products and HyperCard are about it.

In the future, all computers will have television capability—it's just another data source. We also believe that 16-bit stereo will be the minimum sound capability in the future.

MW You'll compete with Digidesign?

SORENSON No, this will be good for both of us. Digidesign has hardware but their technical advantage is mainly software. And we have file compatibility with them.

MW What's next?

SORENSON Real-time windows. The hardware is OK for that now. What we need is software.

MW In terms of hardware in the video marketplace, what are the best products other than your own?

SORENSON E-Machines. They have good engineers. SuperMac has a few good engineers and a great visionary. I wish we could work more with Edelman [Steve Edelman, chief scientist of SuperMac], but the industry is so competitive that's not possible. Radius is more prone to buying technology, they're a big company. When Vollum [Steve Vollum, president of E-Machines] does a product, he does it right. It has all of the FCC ratings, and it's low power.

MW What will RasterOps be selling in the future?

SORENSON We'll sell video, imaging, and we should be into chips and specialized products. Do we really need five companies selling megapixel displays and 19-inch monitors? No. All that stuff will be on the motherboard. True Color and other specialized markets will be where we are.

(continues)

Jesse James

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MW What happened to CAD on the Macintosh?

SORENSON Is it just that Apple isn't behind it? Ask Nick Pavlovic at Visual Information Development. He's down there beating his head against the wall on this every day. There just isn't any solid modeling on the Mac; there isn't enough power. You need 15 to 20 MIPS and a lot more floating-point performance for solid modeling. And there are lots of other more powerful workstations than the Mac. Sun has 12 MIPS on its low-end workstation. So Sun owns CAD.

MW What's Apple's solution to that?

SORENSON Somehow they have to do a discontinuous jump in performance. That is not easy with another company's [Motorola's] microprocessor. IBM got to 20 to 25 MIPS by introducing its own version of a RISC-based processor. Sun went to SPARC technology. Apple's slow because of Motorola. But the good side is that there is shrink-wrapped software for the Mac. There is none for Sun. You can't go into Egghead and get software for Sun workstations.

MW What happened to AutoCAD on the Mac?

SORENSON We had it running on our 118 board, but there was no interest. Radius accelerated it with a display list, but now they don't talk about it either. Intergraph has introduced its CAD product for the Mac twice. Still nothing.

MW One thing people are interested in, according to you, is spatial resolution. What are the limits on the number of pixels that you can put on a screen?

SORENSON It depends on the shadow-mask technology [of the cathode ray tube]. Today we [the industry] work with .31 dot-pitch technology on 19-inch screens. That's about 70 pixels to the inch. There are .21, .26, and .28 millimeter configurations of shadow masks, but they're not in production here, and they're very expensive. For .21 dot pitch you can put up about 1600 by 1280 pixels. For most applications that's overkill and takes four times the RAM.

That's why the Trinitron sells so well. Standard mask technology has holes perforated in the metal shadow mask. So if you put more holes into the mask and turn up the power, the mask heats up. The metal is fragile due to all of the holes and it begins to dome [to deform], causing distortion. A real problem.

Trinitron has vertical stripes and curves only along the *x*-axis, but you have a hard time keeping that in place too. That's why you see two horizontal wires across the face of Sony monitors.

MW I thought the time limits on the

(continues)

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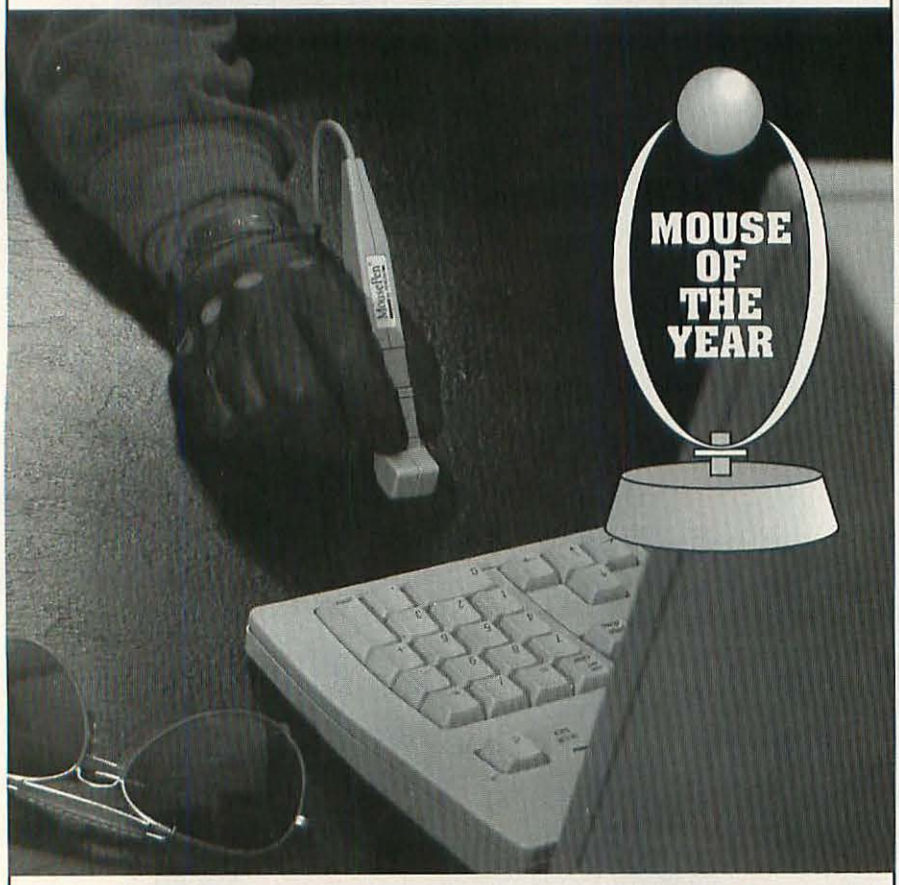

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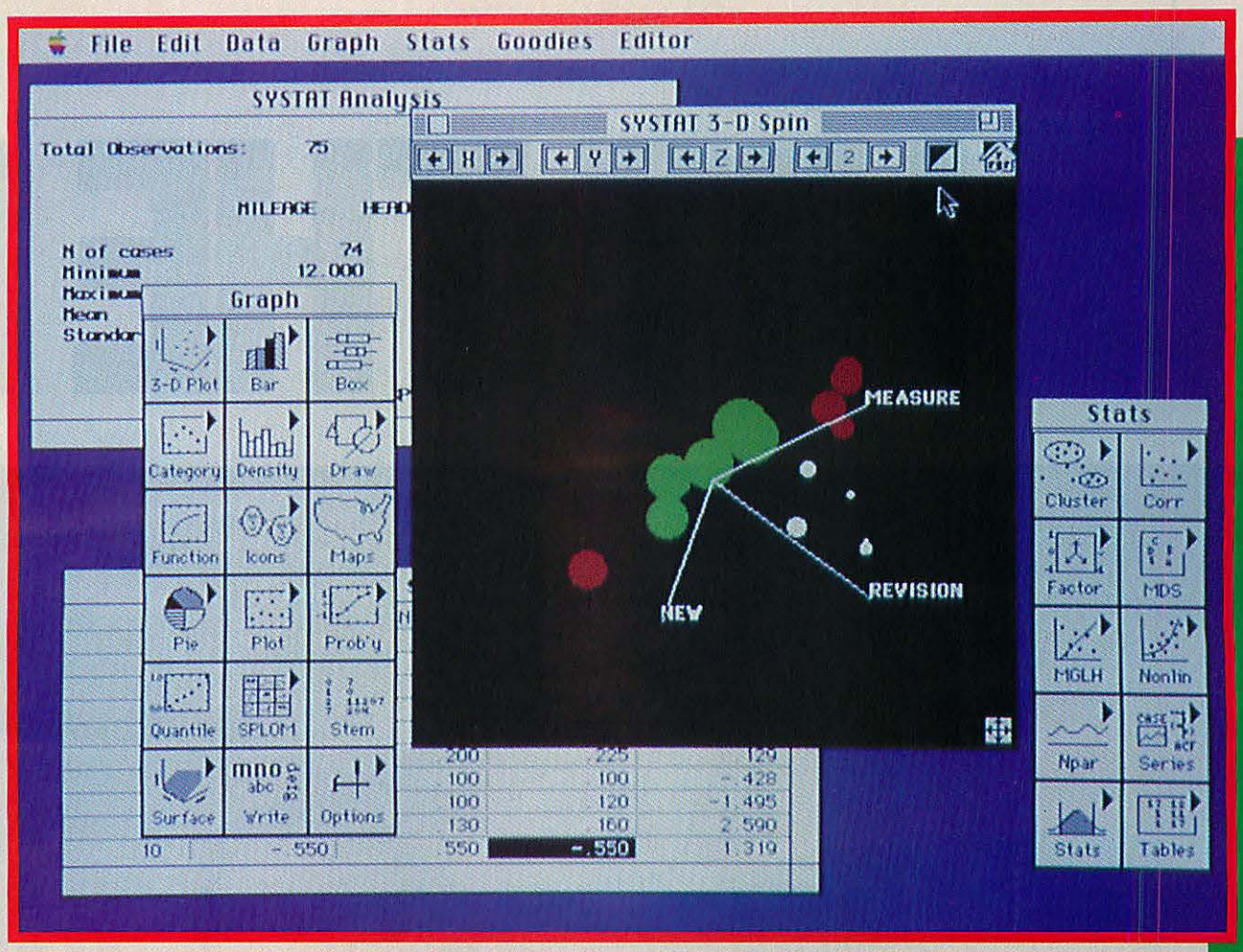

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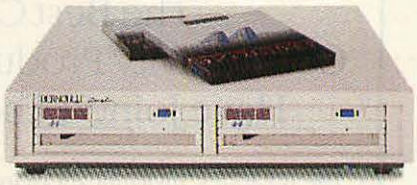

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Trinitron technology patent had run out.

SORENSON My understanding is that the patent has run out. But Sony spent a half-billion dollars on a plant to build the screens. Not everyone can do that.

MW What do you think is the future of color printers?

SORENSON Over the next two years color fax machines will drive the color printer market—die-sublimation printers that use what is basically a thermal approach to make continuous tones that you won't believe.

MW Hell, Scitex, Crosfield all seem to be interested in the Macintosh as a technology platform. What's going to happen in color publishing systems?

SORENSON Scitex is on the Mac, but Hell hasn't shown much interest yet. Crosfield has Lightspeed, which is on the Mac, and Du Pont has adopted a more broad-based approach. Berthold has moved to the Sun, and a Dai Nippon screen for sun has been announced. Both Linotronic and Varityper use the Macintosh, and Atex uses IBM as well.

MW There was a small scandal some months ago when your company was accused of allowing a trade weekly to take a picture of an unreleased Apple machine.

SORENSON For the record, I can only say that we caught the perpetrator and severly reprimanded him. And Apple reinstated us as good guys.

Someone should do a story on this. Apple has a person sign a nondisclosure agreement in order to work on a new product. Then, some weeks later, a box arrives in the normal shipping department of a company. Ours was in-house for three days, but we can't even prove the machine was here, and we can't prove our staff did it. But we couldn't prove it was not us either.

Apple has no real legal standing with regard to its secrets until it maintains control over those secrets, but it does have control over us in terms of our developer relationship.

MW When will we see flat-panel display technology as a practical peripheral for the Macintosh?

SORENSON Maybe in two years. Everyone says that CRTs are dinosaurs, but there's still no replacement for them. No one wants to look at a dim display, and the economies of scale in manufacturing are with CRTs.

You'll see some type of color LCD [liquid crystal display]. They're at the 300,000-element [pixel] stage now. When the count gets up to 1 million, you'll see them useful as displays. They'll be less costly if they are able to penetrate the consumer market.

That still doesn't explain why a 19-inch monitor costs $4000 and a 19-inch television only $400. That's be-

(continues)

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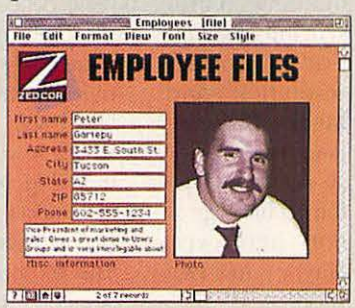

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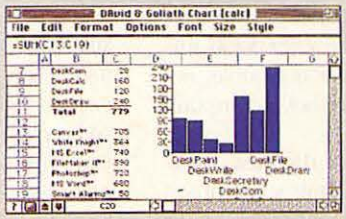

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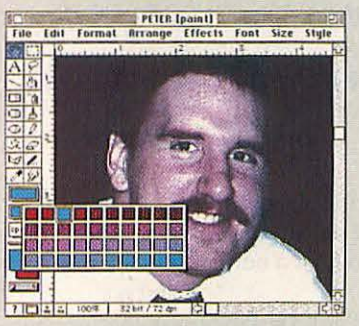

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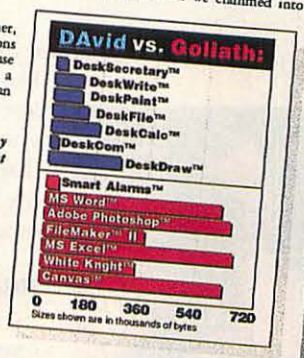

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cause there is ten times the bandwidth for the monitor. One million pixels versus 250,000. We refresh them at 75 times per second versus 30 times for a television. Four times the number of elements to refresh. Two and one half times faster. More power, more heat, more magnetism. The shadow masks are more costly to build. The spot size for a monitor is .31mm versus .5mm on a television.

MW One issue being discussed is photorealism and applications that modify images.

SORENSON Right. There are major issues with digital photo retouching. Who owns what in a scan if someone digitizes a photo and adds content. That's a big problem for the entire entertainment industry. Whose value is added if two or three artists work on a piece? Where is the real value? But [the technology] does give more control to the graphic arts people.

How will it affect society? Look at insurance companies with all of their contracts. Consider the ability to digitally alter, change the signature in the signature block, and output a new contract.

In the future people will be encrypting digital photography to determine whether the data is authentic or not. Every aspect of business has to think about what new media will mean. The paperless future. How do you authenticate any document? It's the same issue with music. What we're doing with digital images, Digidesign is doing with digital sound.

MW Graphics products are proliferating on the Mac. Is there any chance we'll end up with the mess there is on the IBM PC side?

SORENSON Apple has more control [than IBM]. There are no clones. Apple has led with its own interface, and already has what is happening now with Windows. Even with Windows, developers can't [re-create the PC mess]. They have to write display drivers just as with the Mac. And now there are five graphic user interfaces—New Wave, Windows, Open Look, Sun View, Presentation Manager—in addition to the Macintosh. Not 35 display standards.

MW But will the Mac market become like the PC market with many graphics boards that will not drive the monitors of other companies?

We don't want to find that magnetism is healthful then be accused of fixing a nonproblem and soaking the consumer

SORENSON Now that Macintosh-level displays are coming to the PC we won't wrestle with that. Computer monitor manufacturers are building multisyncing displays that have higher resolution and higher refresh rates that work for all platforms. But the technology is not here yet. Maybe in two years.

MW What companies in the Macintosh market are going to come and go?

SORENSON Well, in the prepress market you have companies that add software and expertise to other people's hardware. If a company like that has $400 million in revenues, they better not make over $200 million in hardware. That is trouble, not value added. They are not a computer company.

I have a vision of the past. Companies like Calma selling a [graphics] system for $250,000 and Daisy selling a system for $125,000 are both gone.

Color prepress companies are facing the same issues now, with the same dilemma in front of them as CAD companies. They sell software and computers. They have to cease being a computer company. The same concerns confront entertainment video [suppliers] where the products used to cost $250,000. Now Digital F/X replaces a $300,000 system for $30,000.

MW How does high-definition television [HDTV] overlap with the future of computer displays?

SORENSON What drives HDTV? Color TV sales are flat so the manufacturers have to create a new system. It will probably cost a billion dollars to get a new standard. I want more and better programming, not better television pictures. I have 49 channels of cable crap at home. Why spend a billion dollars for a better picture unless you get better programs too?

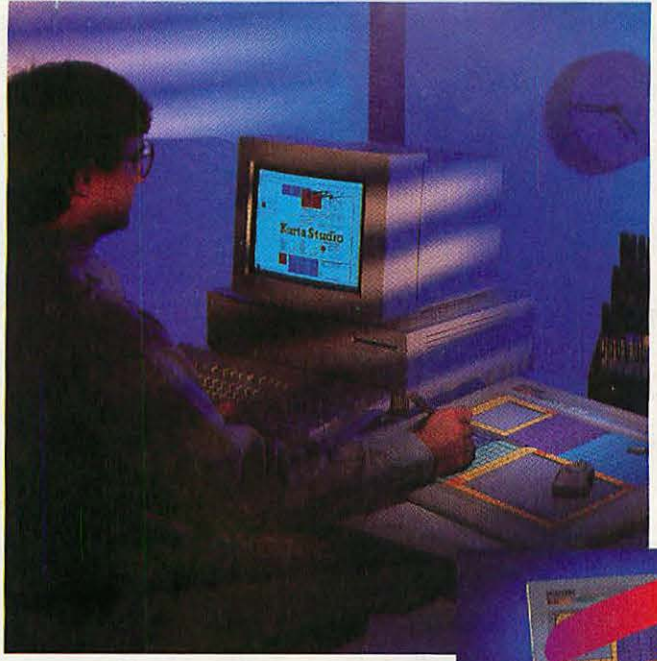
MW What is your feeling about the extremely-low-frequency (ELF) issue?

SORENSON It's past being a single issue but it's something we need to study. I really believe that technology can solve the problem once we know what the issue is—what standard we have to meet. Monitors [the industry] aren't like PG&E or the electrical industry where it will cost $10 billion to move the cables in California.

I don't think there is a conspiracy on the issue. We'll solve the problem. This industry is so competitive that if someone has the technology to solve the problem, they'll announce it. What we don't want to find out in five years is that magnetism is healthful and then be accused of raising our prices to fix a nonproblem and soaking the consumer for extra money.

MW Any favorite stories about the history of RasterOps?

SORENSON When Apple came to see our first True Color Mac product (the ColorBoard 104), the comment was, "Where did you guys get source code?" Our guys considered this a compliment, since we had worked incredibly hard to make that first 3-pass system compatible with the Mac's operating system. M



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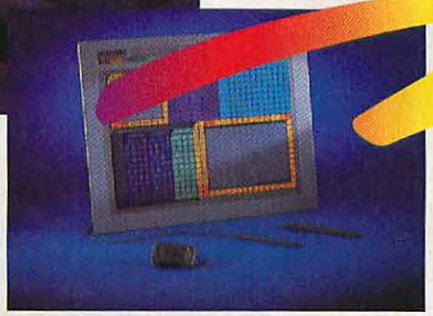

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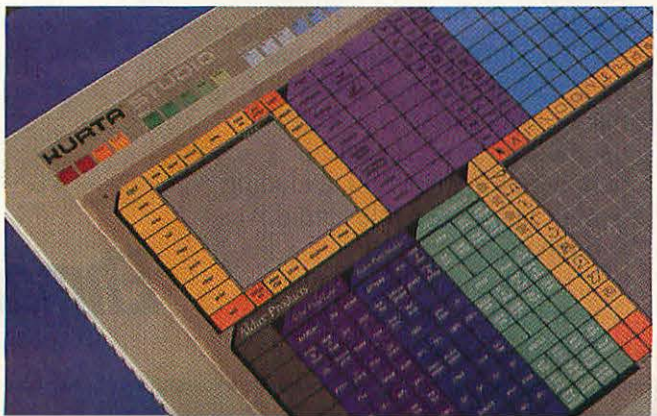

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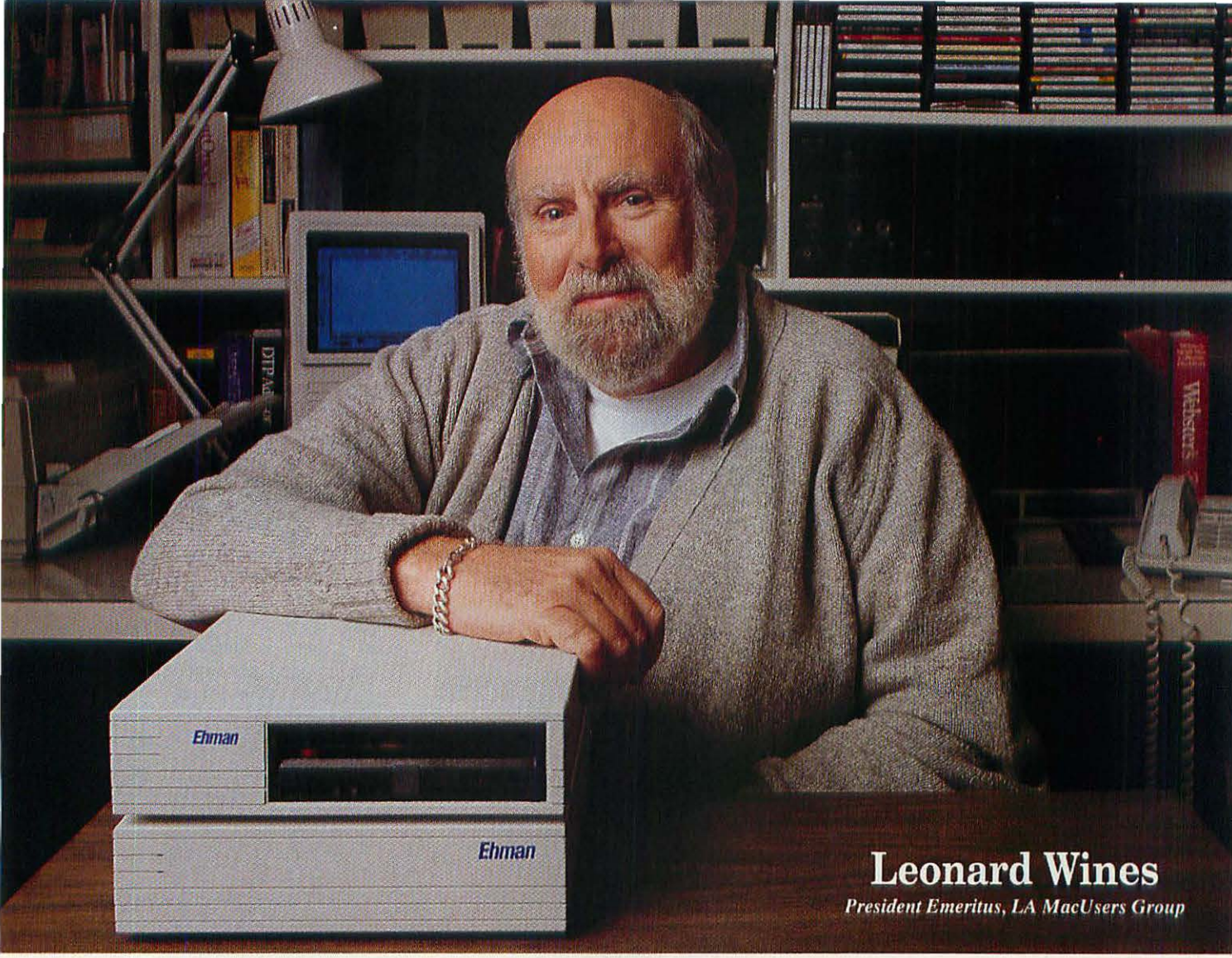

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MACWORLD NEWS

by Dan Littman and Tom Moran

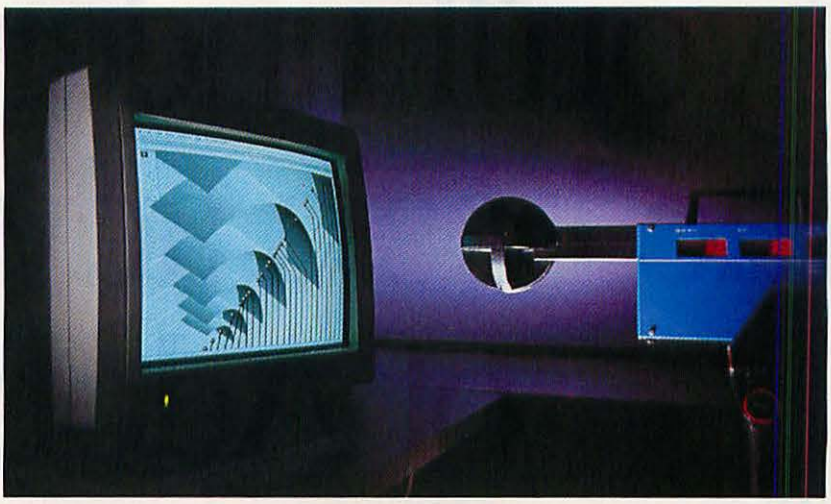
Sigma Designs Reduces Monitor Emissions

Responding to consumer concerns over possible health hazards from VLF emissions, Sigma Designs has begun selling reduced-VLF monitors in the United States. The company had previously offered the monitors in Sweden, which has set a standard for VLF exposure.

The monitors, all modified versions of existing products for the U.S. market, are the PageView, the SilverView, and the L-View. The PageView is a 15-inch single-page monitor, the SilverView is a 21-inch landscape display with 256 shades of gray, and the L-View is a 19-inch monitor that offers variable resolution for text documents and spreadsheets.

Sigma Designs cuts the emission of VLF by adding electromagnetic-field-canceling coils around the CRT's yoke, where the problem originates. VLF is reduced by a factor of about ten.

The PageView, SilverView, and L-View are available now. All will cost about $200 more than the same monitor without the VLF-reducing circuitry. The company has also announced that it is working on low-ELF monitors that it expects to ship in the first quarter of 1991. For more information, call Sigma Designs at 415/770-0100.—T.M.



LUIS DELGADO

Measuring up: The Sigma Designs L-View monitor being tested for possibly hazardous VLF emissions. Electrical coils around the CRT's yoke cancel out most of the VLF radiation.

Twelve-Pages-per-Minute Printer Serves Networks

Qume Corporation has cranked up the speed in the laser-printer race with the introduction of a 12-pages-per-minute printer designed for desktop publishing in networked environments. Compatible with Macs or PCs, the CrystalPrint Express incorporates a 32-bit RISC processor for faster preparation of complicated pages.

Qume includes its own PostScript-emulation software, which the company says works with Adobe Type 1 fonts. The CrystalPrint Express also emulates the HP LaserJet Series II—allowing the Qume printer to accept PCL files from the IBM PC world. The printer includes AppleTalk, serial, and parallel interfaces, and it can switch instantly from PostScript emulation to LaserJet emulation. Qume puts all the printer's firmware on a ROM cartridge so that all the system software can be simply replaced as upgrades occur.

The CrystalPrint Express prints at 300 by 300 dpi or at 600 by 300 dpi with bitmap smoothing for cleaner edges. The suggested list price of the CrystalPrint Express is $5595, including 3MB of RAM. For 600-by-300-dpi printing, another 2MB are required. The maximum, 8MB of RAM supports font caching.

At press time the printer was slated

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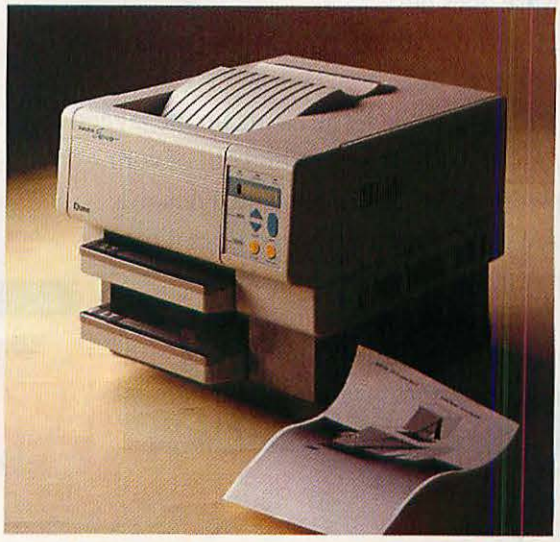

MARK JOHANN

Qume's CrystalPrint Express can print either Mac PostScript documents or HP PCL files from IBM PCs.

Before you finish this headline, you'll understand the basic advantage of Adobe Type Manager 2.0.

We're glad we had a chance to clear things up. Because that's exactly what Adobe Type Manager™ software does best.

And now Adobe Type Manager 2.0 does it even better.

Because, while it still clears up the jagged text on your Macintosh® screen and out of your Apple ImageWriter® or Hewlett-Packard DeskWriter,™ this new version does it more than twice as fast as its predecessor.

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And do it before you start another headline.

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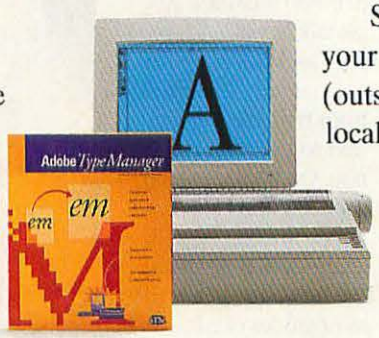

ADOBE

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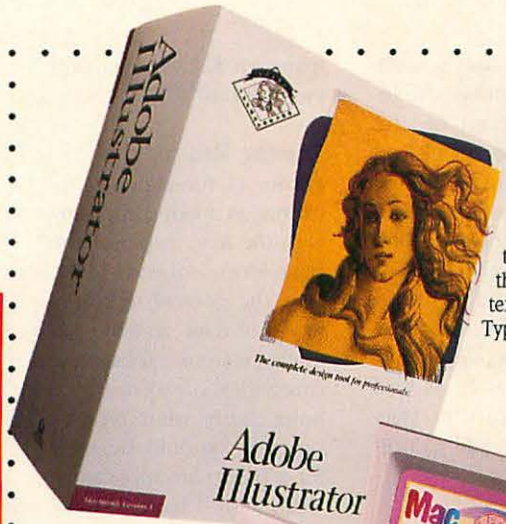

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Baseline MacPAKS™ *....30 day MBG*

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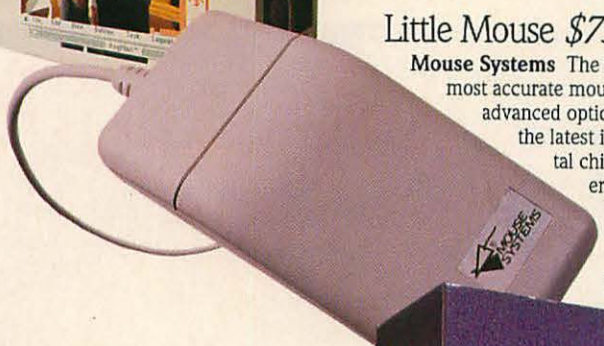
Key Plan *$242*

Symmetry Software Plan without pain! All the tools you need to quickly and easily create, analyze, fine tune, present, and track your plans. Key Plan gets you from outline to deadline effortlessly.



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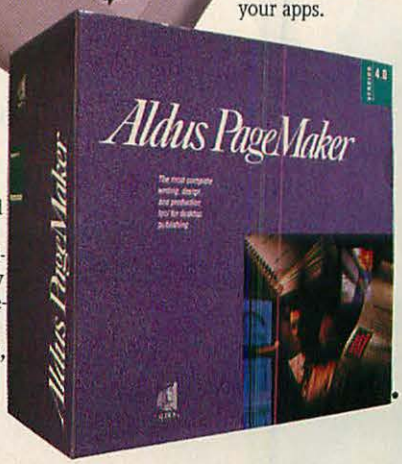
Mouse Systems The smallest, lightest and most accurate mouse ever is a result of advanced optical technology with the latest in CMOS analog/digital chip design. This synergy of ingredients gives you greater control, precision, and speed in all your apps.



PageMaker 4.0 *$495*

Aldus The most complete writing, design, and production tool you can use to create professional-quality publications. New features include fully integrated story editor, spelling checker, find/change, style sheets, and table.

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MacsPlace

SMP-GS Surge Suppressor
Surge suppressor designed to filter spike and line noise to protect fax machines and to help prevent garbled data during transmission. $59.95. Tripp Lite, 312/329-1777.

BOOKS

The Art of Human-Computer Interface Design
Collection of more than 50 never-before-published articles centering on the relationship between humans and computers. Represents a variety of approaches, viewpoints, motivations, and goals. Topics covered range from practical studies to philosophical discussions to prophecies of a world where cyberspace and multimedia systems are commonplace. Edited by Brenda Laurel. $26.95. Addison-Wesley, 617/944-3700 ext. 2278.

Inside SuperCard
Book that introduces SuperCard and HyperCard developers to authoring stand-alone animated, multimedia Mac applications. Written by Andrew Himes and Craig Ragland, with technical assistance from Bill Appleton, the creator of SuperCard. $22.95. Microsoft Press, 800/677-7377.

Mac-Graphics
Companion guide for designers using the Macintosh in desktop publishing. Includes sections devoted to type, screen, images, and rules; source references on process color in relation to its use in desktop publishing; and a dictionary of terms commonly used in the prepress and design industry. Written by Ching-San Lim and Gim Lee. $49.95. Octogram Design, 415/345-9420.

NASA Spacelink User's Guide
Guide that describes the information offered on the NASA online Spacelink service and tells readers how to use it. Explains how users can access the Spacelink computer to get current news releases, launch and television schedules for space-shuttle missions, historical information, as well as space graphics in MacPaint format. $8. CORE, 209/229-6480.

The Programmer's Apple Mac Sourcebook
Programmer's Macintosh sourcebook written by Thom Hogan. Patterned after his previous book, *The Programmer's PC Sourcebook*, the book is a desktop reference covering data formats, software and disk-resource formats, HyperCard, Installer, the System and the Finder, the NuBus slot manager. $22.95. Microsoft Press, 800/677-7377.

Xplaining Macintosh
Primer of fundamental information about computing with the Mac. Explores the basic functional units of the Mac, the internal representation of data, and the operating system; explains the categories of software to help clarify what type of programs should be used for a particular application. Written by Charles Stone. $21.95. Multisoft Resources, 301/977-6972. M

To have your product considered for inclusion in *New Products*, send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number (and two copies of software) to New Products Editor, *Macworld*, 501 Second St., San Francisco, CA 94107.

Word Solution Engine
Developer's tool for basic text editing, with font and style support and the ability to buffer up to 16MB of data. Accesses the Mac Script Manager for systems using non-Roman fonts. 1MB min. memory. $300. DataPak Software, 206/573-9155, 800/327-6703.

ACCESSORIES

Compu-Rest
Articulated arm-and-wrist-support that enables free movement of hands over a keyboard, digitizer, or other flat surface. $249.95. Flex-Vision, 707/544-3020.

Compu-Rest

Dick Tracy and Mickey Mouse MousePads
Circular die-cut mouse pads with Dick Tracy and Mickey Mouse images. $15.95. The Computer Giftware Company, 818/500-7857.

Economy Diskette Drawer
Corrugated cardboard drawers for filing and storing disks. Each drawer stores 175 disks with 16 dividers and can slide open while stacked. $6.95. Merit Abrasive Products, 800/658-0322.

EM1 Radiation Meter
Meter for measuring ELF (extremely-low-frequency) magnetic radiation from video monitors, power supplies, and other sources. Can be used to determine safe working distance from monitor, detect equipment problems, and check fields from outside power lines. $89.95. Schaefer Applied Technology, 617/320-9900, 800/366-5500 ext. 215.

Mac Hard Shell Carrying Case
High-density polyethylene case for the compact Mac (models 128K through the SE/30). Hard-shelled and double-walled, case is lockable, weighs about the same as a soft-sided case, and holds the Mac along with an external hard drive or small, portable printer. $129.95. BCM, 316/683-5211 ext. 917, 800/432-5211 ext. 917.

Mac Hard Shell Carrying Case

Maxi-Lite
Video-display safety apron designed to provide the wearer protection from extremely-low-frequency, ionized, and nonionized radiation emitted by computer display terminals and radio display screens. Covers the chest and abdomen with a .33mm layer of lightweight lead material. $99.95 plus $7 s/h. Maxi-Lite, 215/929-3708.

The NoRad SuperShield
Radiation, glare, and reflection shields designed to fit 19-inch and two-page display monitors that have a curved bezel, or housing, surrounding the glass display. Eliminates glare and reflections using monofilament mesh that is metalized to drain static and block nonionizing and electromagnetic radiation. $349. NoRad Corporation, 213/395-0800.

Pigments for your imagination.

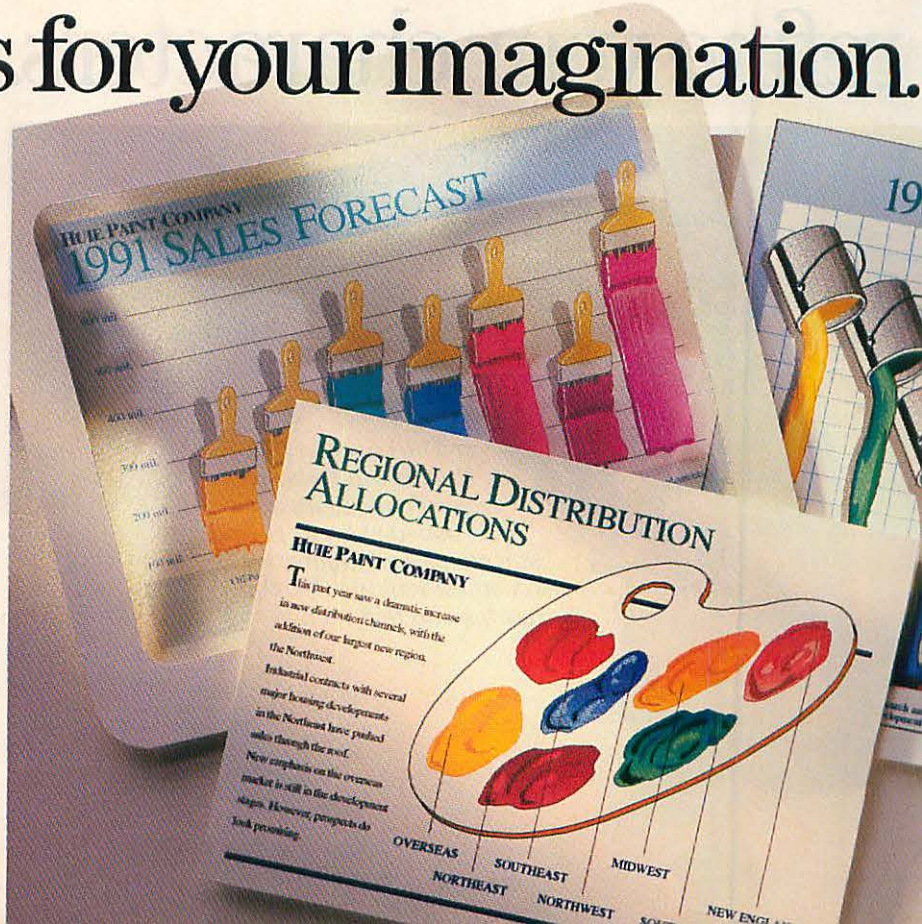
HP color printers let you draw splashy color from your Macintosh.

Entertain your thoughts with HP's PaintJet and PaintWriter XL color printers. Both are fully Mac-compatible and let you use all Quickdraw-based software applications. That means high-quality Macintosh II output in 16.7 million colors.

Print on paper or transparencies with 13 scalable outline fonts. And for shared use, the PaintWriter XL offers AppleTalk, faster speed, and auto sheet feed. For sample output and the name of your authorized HP dealer, call **1-800-752-0900, Ext. 1167.**

There is a better way.

HEWLETT PACKARD



you blast your way across enemy-invaded territory. You have to avoid running into hills, being blown up, bombing your own home city, and crash landing. Game runs at double speed when you achieve 100,000 points. Comes with sound effects. 1MB min. memory. $49.95. Casady & Greene, 408/624-8716.

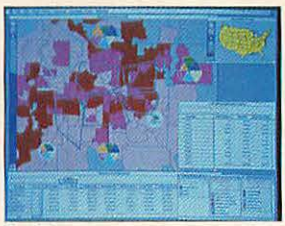
Software Bridge Macintosh
File-translation utility for the Mac. Enables you to translate files created on a DOS-based machine—or on another word processor on the Mac—into MacWrite II, Microsoft Word, or WordPerfect format. 1MB min. memory. $129. Systems Compatibility, 312/329-0700.

Sound Clips Volumes 3 and 4
Sound clips for creating effects in HyperCard and SuperCard. Volume 3, Sports and Recreation, includes baseball, basketball, football, roulette, and slot-machine sounds; volume 4, Trains, Planes and Automobiles, includes car crashes, tractor trailers, and airplanes landing. 1MB min. memory. $99 each volume. Tactic Software, 305/378-4110.

Spreadware Statistics Menu
Statistical application that works within Wingz. Adds a menu to the Wingz menu bar that provides the calculation of probabilities for z, F, t, and chi-square distributions; descriptive t-tests for independent and correlated data; ANOVA for one-way, two-way, and repeated measures. 1MB min. memory. $89. Spreadware, 415/794-4388.

Sticky Notes+
System of notes for HyperCard stacks. Lets user place special notes on cards in stacks when extra text space is needed. 1MB min. memory. $49.95. Survivor Software, 213/410-9527.

Tactician
Information-management tool designed for corporate marketing executives. Can be used as a stand-alone system or to connect a corporate database to IBM DB2, Oracle, Sybase, RdB, Ingres, and Informix platforms. Provides a geographic, demographic, and business database for planning large-scale promotions and ad campaigns. Includes retail-management and sales-management modes. 4MB min. memory. $995 to $10,000 depending on options. Tactics International, 508/475-4475.


Tactician

Virtus WalkThrough
Spatial-design and architectural-visualization package. Lets users create a representation of a three-dimensional building design that can then be used to simulate a walk-through. 1MB min. memory. $895. Virtus, 919/467-9700.

WordCount DA
Word-counting desk accessory that works with files copied to the Clipboard. Can count 4000 words, or about 10 single-spaced pages at one time. 512K min. memory. $19. Intelligence Active Software, 309/833-5959, 800/344-0571.

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refine your characters.

The HP LaserJet III printer delivers the most refined 300 dpi print quality ever. And it's easy to use. When configured with Adobe® PostScript® and AppleTalk interface, the LaserJet III is completely compatible with your Macintosh. All for only $3,700†.

HP offers other Macintosh compatible LaserJets. The new LaserJet IIID printer with increased paper-handling capability for $5,125†. And the affordable LaserJet IIP printer for only $2,595†. Call **1-800-752-0900, Ext. 1168** for the name of your nearest authorized HP dealer and ask for the Macintosh versions of the LaserJet line.

There is a better way.

HEWLETT PACKARD

and English documents. Includes a sorting function that will enable some Mac programs to sort correctly in Russian and English. Application lets the user enter fonts in Latin or Cyrillic characters from within any application, and switch between Russian and English with one keystroke. Comes with phonetic and Soviet standard keyboard layouts. 1MB min. memory. $79.95. GLPS Products, 919/968-6780, 800/869-9567.

Russian Noun Tutor with Sound

Tutorial and series of drills on Russian case usage and noun declensions. Includes more than 15MB of digitized sound compressed to 5MB on 9 disks. Drills the user on more than 350 noun forms with more than 180 sentences, recorded by native Russian speakers. Program also includes sections on gender, number, irregularities, and case usage with a reference section for noun declensions. 1MB min. memory. $79.95. HyperGlot, 615/558-8270, 800/726-5087.

ScoreMaster

Music indexing system composed of a database containing a catalog of six of the popular commercial music libraries that supply musical recordings for the broadcast, audio-visual, and presentation markets. Also includes a CD ROM with short digitized excerpts of the compositions for previewing the recording directly from the computer. 1MB min. memory. $2250 to $2650 depending on the number of libraries to be listed on the screen. Computer Music Consortium, 212/629-4365.

Shipshape

Computerized shipping system that includes UPS rate tables, computer manifest, summaries, reports, and forms, Federal Express Airbills and rate tables, U.S. postal rate tables. Airborne Express and other carriers' forms are also available. Has multiple-printer switch control INIT and on-screen help. 2MB min. memory. $1995. Elefunt Software, 415/843-7725.

Signal Processing Program

General-purpose program for generating, manipulating, and simulating analog signals. Performs linear and nonlinear time-domain waveform analysis, forward and reverse Fast Fourier transforms, Laplace transforms, transfer-function analysis, and other types of statistics. Also used for graphical display of signals, spectra, and transfer-function data. 512K min. memory. $349.95. BV Engineering, 714/781-0252.

Simplifiler

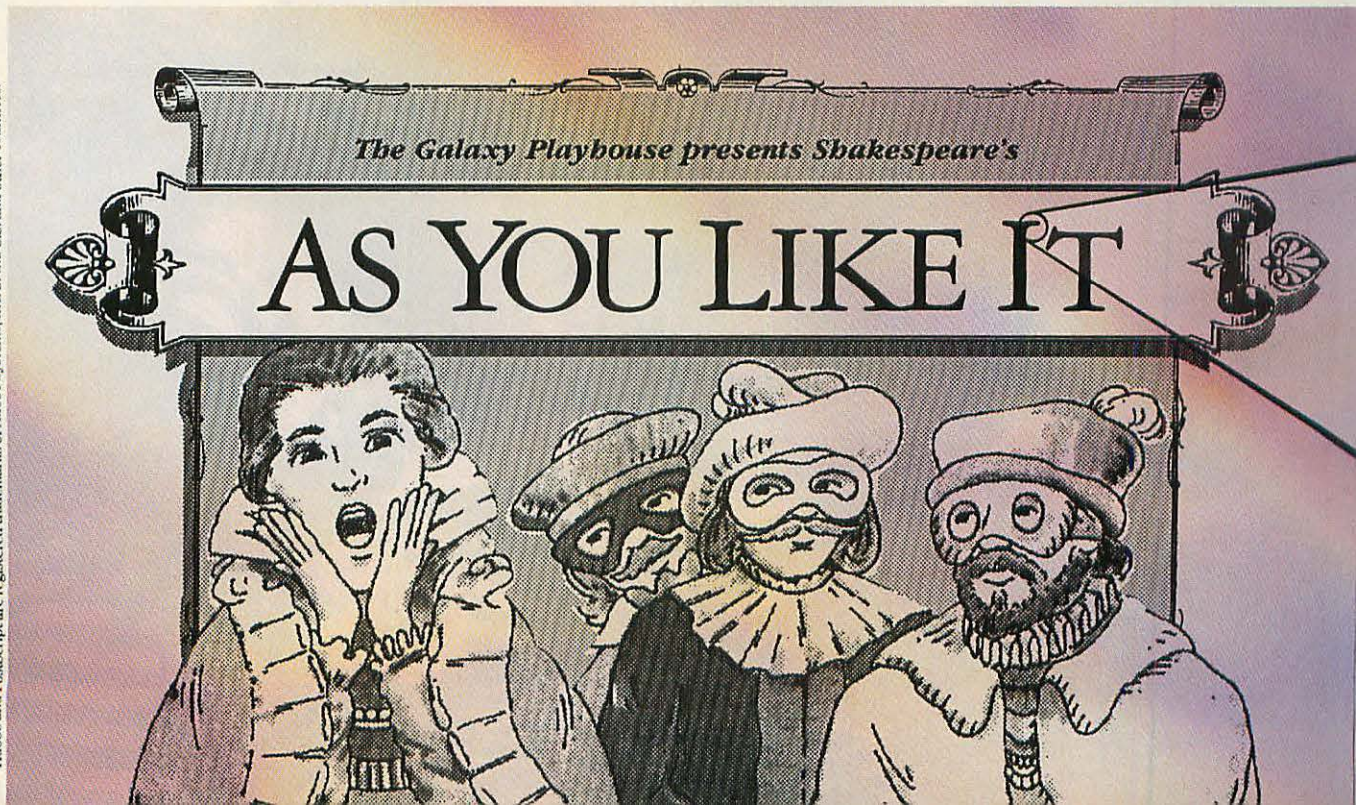
Personal information–management application based on 4th Dimension that can be used to track contacts; follow up records; and produce letters, labels, and reports. Includes manual and 4D Runtime. 1MB min. memory. $500. Zicon Software, 503/635-9622.

Sky Shadow

Arcade game in which you fly a one-person spaceship over a changing cityscape as

Sky Shadow

With the HP LaserJet III, you can



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*Serif depicted conceptually represents the benefit of variable dot sizes.
†Suggested U.S. list price for full Macintosh configurations including minimum required memory.
Adobe and PostScript are registered trademarks of Adobe Systems, Inc. in the U.S. and other countries.

NameViewer

INIT that lets you see the full 32-character width of file names in the Open dialog box. 512KE min. memory. $10 shareware. AaStar Technologies, 508/486-8532.

The Official Sporting News Baseball Guide and Register on CD-ROM

CD ROM software that reviews Major League Baseball from 1984 to 1990. Contains historical information dating back to the early 1900s. Includes Most Valuable Players table, American and National League Championship and World Series reviews, All-Star Game results and team listings, has a section on The Hall of Fame and includes close to 1000 photographs. 1MB min. memory. $249. Wayzata Technology, 612/447-7321, 800/735-7321.

Sporting News Baseball Guide

ProBiz Manager

Software that automates the tracking of time and expenses for estimates, invoices, and other functions associated with small- and medium-size businesses. Includes features for tracking clients, maintaining mailing lists, and generating reports. Can be adapted to a variety of service-related industries. 1MB min. memory. $1495. DataBased, 512/684-5661, 800/345-0521.

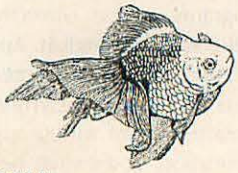
Protector Shark

Combination screen saver and game in which a shark chases a spear gun–toting scuba diver across the screen. You can use the mouse to control the diver and try to spear the shark before it eats the diver. Program keeps score. 512K min. memory. $49.95. IBIS Software, 415/546-1917.

Protector Shark

Quick Art

Clip art consisting of professionally drawn MacPaint files in cartoon, realistic, and silhouette styles. Five disks cover farms, food, holidays, horticulture, and pets. Images may be used in any paint program or placed directly into a page-layout program. 512KE min. memory. $34.95 per disk. Wheeler Arts, 217/359-6816.



Quick Art

Report Ideas DA

Online reference guide that comes with a thesaurus of more than 70,000 phrases and a 42-page handbook of writer's guidelines. Can be used as a reference tool as you write, or to outline and draft documents from the beginning. 1MB min. memory. $79. Intelligence Active Software, 309/833-5959, 800/344-0571.

Russian & English

Language software for producing bilingual Russian

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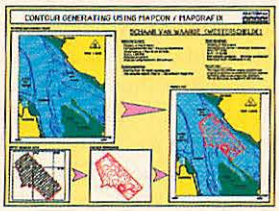
got it made in the shades.

*Suggested U.S. list price. ©1990 Hewlett-Packard Company PE12004

Manapro General Ledger

Multilingual general ledger program that enables the user to work in one language and print the reports out in another. Works in English, Spanish, Italian, French, and Portuguese. Language can be changed with a command that instantaneously gives all the menus, commands, windows, and reports in the chosen language. 1MB min. memory. $795. Manapro, 305/486-5900.



MapCon

MapCon

Gridding and contouring system for use in engineering, hydrography, and surveying applications. Incorporates contouring, kriging, generation of traverses and sections, 3-D representation, volume calculation. 2MB min. memory. $3000. ComGrafix, 813/443-6807.

Maple Picture Publishing

Software that can compress gray-scale images up to a ratio of 16:1 or to 10 to 15 percent of their original file size. Uses a raster-to-vector compression process and accepts any scanned image in TIFF format for conversion to PICT format. 2MB min. memory. $395. Stonehand, 617/868-4656.

Marketer's Partner

Client- and lead-tracking system designed to help businesses analyze current and potential marketplaces. Prints mailing labels, form letters, and lists. Includes automatic calling and telemarketing follow-up features. 1MB min. memory. $495; if purchased with The Store Manager program from DataBased $295. DataBased, 512/684-5661, 800/345-0521.

MasterKey for Wingz

Software designed to decrypt a password on encrypted files in Wingz. 1MB min. memory. $85. New Visions, 405/232-6152.

Might and Magic Book II: Gates to Another World

Part of Electronic Arts' Might and Magic series of fantasy role–playing games. Sequel to Book I: Secret of Inner Sanctum. Book II players explore and seek adventure in a detailed fantasy world called Cron, where rumors have foretold great destruction. As the game goes on the rumors become more believable and realistic, until you must finally discover whether they are true. 1MB min. memory. $59.95. Electronic Arts, 800/245-4525.

Mission Starlight

Spaceflight arcade game in which you approach five planets, trying to knock out the power plants, which belong to an evil invader named Adolf Blitter. You control your spaceship, blast at the power plants, and attempt to avoid being destroyed. 1MB min. memory. $49.95. Casady & Greene, 408/624-8716.

Mission Starlight

With the HP ScanJet Plus, you've

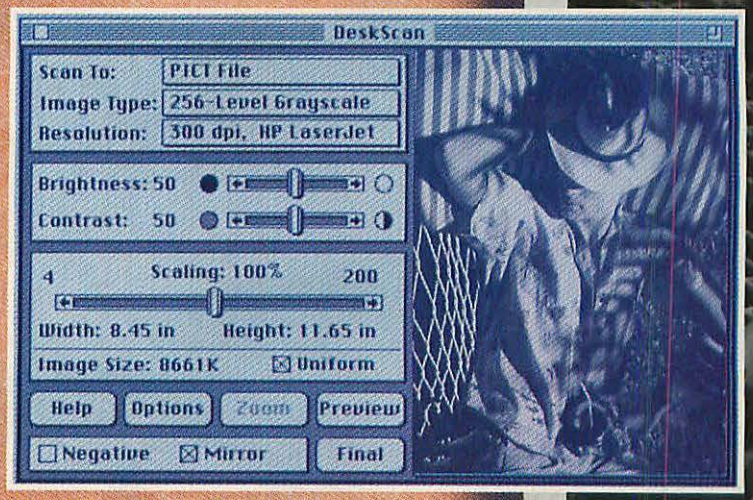
The HP ScanJet Plus scanner provides 8-bit photographic-quality scanning.

That means 256 shades of gray for the hottest-looking output from your Mac. And it's so easy, too. At the click of a mouse, you can get negative or mirror images, as well as scaling in 1% increments from 4-200%. All for $2,190,* about what you would expect to pay for a 4-bit scanner.

So if you want the richest, most detailed images from your Mac, you've got it made with Hewlett-Packard. Call **1-800-752-0900, Ext. 1005** for your authorized HP dealer.

There is a better way.

HEWLETT PACKARD



For all its amenities, ease of use, good image quality, and low price, *Publish!* recommends the HP ScanJet Plus as their "Best Buy."

The Leadership Challenge

Interactive simulation designed to test user's leadership style on the job. Program describes various situations that might come up with employees, and user selects from a multiple-choice set of responses. Leadership style is determined by user's responses. 1MB min. memory. $99. Positive Employee Relations Council, 404/447-1876.

Leads

Sales lead–tracking application that automates the process of capturing leads, fulfilling information, managing follow-ups, and generating detailed management reports. Can be used to track and analyze leads from advertising, trade shows, and direct marketing programs.2.5MB min. memory. $1795. Endpoint, 408/737-3831.

LinguaROM

CD ROM that contains 27 HyperGlot language tutorials with sound. Contains lessons for learning Spanish, French, German, Italian, Russian, Japanese, and Chinese. Digitized sounds help students learn proper pronunciation and intonation. Reviews and tests can be modified for individual student levels. 1MB min. memory. $499. HyperGlot/Educorp, 619/259-0255.

LinguaROM

MacFortran II

FORTRAN compiler for the Mac II series and the Mac SE/30 that can be validated using both the ANSI X3.9 1978 and D9D MIL-STD 1753 standards. Incorporates many VAX/VMS, IBM/VS, and Fortran 90 extensions. 2MB min. memory. $595. Absoft, 313/853-0050.

MacGridzo

Gridding, contouring, and 3-D visualization package for modeling raw *x, y, z* data. Lets you create labeled contour and base maps, 3-D views, and cross-sections, and calculate area, volumes, and surface area. 1MB min. memory. $400. RockWare, 303/423-5645.

MacroMind XObject Developer's Toolkit

Toolkit that lets developers create XObjects for use in MacroMind Director and in future MacroMind products. Like HyperCard XCMDS, XObjects give users control over external media devices, such as audio CD players, videodisc and videotape players, and videotape controllers from inside Director. Toolkit lets users add pop-up menus, windows, and XCMDs to multimedia presentations and interactive training materials. 1MB min. memory. $20 s/h. MacroMind, 415/442-0200.

Mail Link SMTP

E-mail gateway that uses SMTP (simple mail transfer protocol) to provide seamless connections between TOPS InBox Plus and UNIX Mail and other networks that support SMTP. 2MB min. memory; 1MB if machine is dedicated to gateway use. 2-user gateway license $249, 10-user gateway $995, 50-user gateway $2950, 100-user gateway $4950. TOPS, 415/769-9669.

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have it all. (But keep it to yourself.)

The HP DeskWriter printer puts laser-quality printing right at your fingertips.

With a small size and a $995* price tag, the DeskWriter printer easily fits on your desk and in your budget. And its advanced 300 dpi inkjet technology lets you print sparkling text and detailed graphics.

The DeskWriter is also designed for easy use with your Macintosh, and has both serial and Apple Talk interfaces. It even includes scalable and outline fonts. Combine that with the DeskWriter's whisper-quiet operation, and keeping it to yourself will be that much easier. So call **1-800-752-0900, Ext. 1004** for your authorized HP dealer.

There is a better way.

HEWLETT PACKARD

Editorial Advisor

Computerized style reference for writers and editors. Contains rules for grammar, punctuation, style, composition, citation of sources, indexing, capitalization, treatment of numbers, hyphenation, use of italics, and other editorial conventions. Compiled from various style guides. 1MB min. memory. $149.95. Petroglyph, 415/979-0588.

Fractal Clip Art

A collection of fractal images in MacPaint format, containing 62 different fractals shipped on two 800K disks. Each fractal comes in three sizes. 1MB min. memory. $39.95. Koyn Software, 314/878-9125.

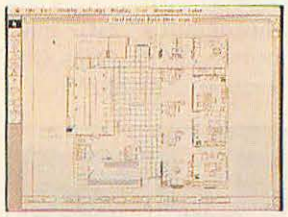
The Game of Life

Shareware game based on a game invented by the English mathematician John Horton Conway. Uses a 2-D grid to represent a universe where a colony of cells resides. Cells live and die according to strict rules of etiquette and crowding. Cell pattern simulates social situations. 1MB min. memory. $15. Computer Software Consultants, 617/964-4011.

Fractal Clip Art

Generic CADD

Two-dimensional computer-aided design and drafting tool that lets user precisely control dimension settings, text, and arrows to match specific design requirements. File format lets user integrate Generic CADD drawings into existing Mac graphics programs. 1MB min. memory. $595. Generic Software, 206/487-2233.



Generic CADD

Hyper-EDDI

Hospital discharge instruction system with editable database for use in emergency departments. Creates individualized discharge instructions and updates patients' records with x-ray and culture results. Downloads patient demographics from the hospital mainframe computer, contains a directory of referral physicians and psychosocial resources. Configurable for use in other medical situations such as urgent care clinics and physicians' offices. 2MB min. memory. Basic configuration $13,000. Orca Software, 206/868-7007.

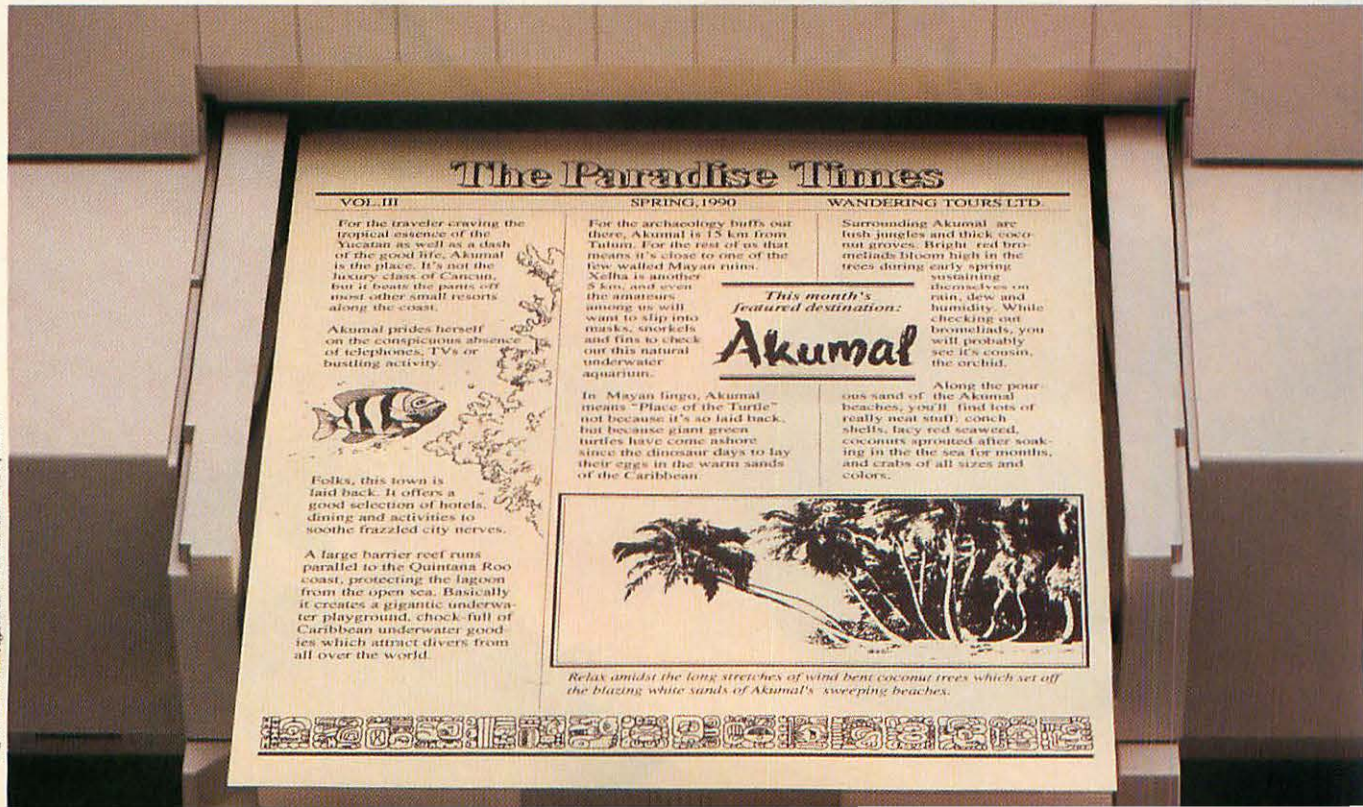
HyperSpanish

HyperCard-based Spanish language program that contains nine lessons including dialogues, grammar, and vocabulary. Uses digitized sounds of native Spanish speaker. 1MB min. memory. $65. Nebula Software, 214/492-2863.

Laser Vietnamese

Vietnamese PostScript laser font based on Palatino. 512KE min. memory. $99.95. Linguist's Software, 206/775-1130.

With the HP DeskWriter, you can



*Suggested U.S. list price. © 1990 Hewlett-Packard Company PE12005
Documents created using Microsoft® Word and Aldus PageMaker®.
Microsoft is a U.S. registered trademark of Microsoft Corp.
PageMaker is a U.S. registered trademark of Aldus Corporation.

new animation and sound capabilities. Compatible with HyperTalk and uses XCMDs so the user can add animations to a HyperCard card by adding a button or a field. Animates multiple objects on any card by having them follow different user-definable paths. Has built-in 24-bit paint program and imports PICT 1 and PICT 2 files, as well as files from the Scrapbook or Clipboard. 1MB min. memory. $295. Motion Works, 604/732-0289.

Alarming Events

Personal scheduler that notifies you of To-Do's, appointments, and deadlines. Can be maintained as a network file for group access. 1MB min memory. $129.95. CE Software, 515/224-1995.

Aldus PrePrint

Software for generating four-color separations at the desktop from PageMaker and TIFF files. Application can also be used to enhance color and gray-scale TIFF images, and to fine-tune separations to accommodate a particular press. Works with files that include text, illustrations, and photographs. 2MB min. memory. $495. Aldus Corporation, 206/628-2320.

Aldus PrePrint

American Handbook of Business Letters

Collection of hundreds of model business letters from the American Management Association, each of which can be opened in any major word processor and customized to the user's individual needs. 1MB min. memory. $59.95. Nova Development, 818/992-3222.

Ask It

Authoring tool designed to help teachers and trainers create interactive tutorials. Prints out conventional paper-based tests and answer keys for correcting the tests and keeping records of scores. 512K min. memory. $99.95. True Basic, 603/298-8517, 800/872-2742.

cc:Mail Link to MCI Mail

Two-way gateway that enables cc:Mail E-mail users to exchange messages transparently with users of MCI Mail and its interconnected systems. Offers access to all MCI services including E-mail, fax, telex, and postal and courier delivery. 512K min. memory. $1295. cc:Mail, 415/961-8800.

ChemWords

Spelling dictionary with more than 30,000 chemistry-related words. Can be used in conjunction with the spelling checker supplied with individual word processors. 1MB min. memory. $50 plus $3 s/h. Scientific Software, 314/993-8586.

Color Convert

Utility software that enables Mac II users to print color images on an ImageWriter II printer using 4-color ribbon. Converts 8-bit or 24-bit color images for printing on 8-color printers. Converted images are saved as PICT documents and may be imported into other DTP software. 1MB min. memory. $55. Prophecy Software, 302/994-1502.

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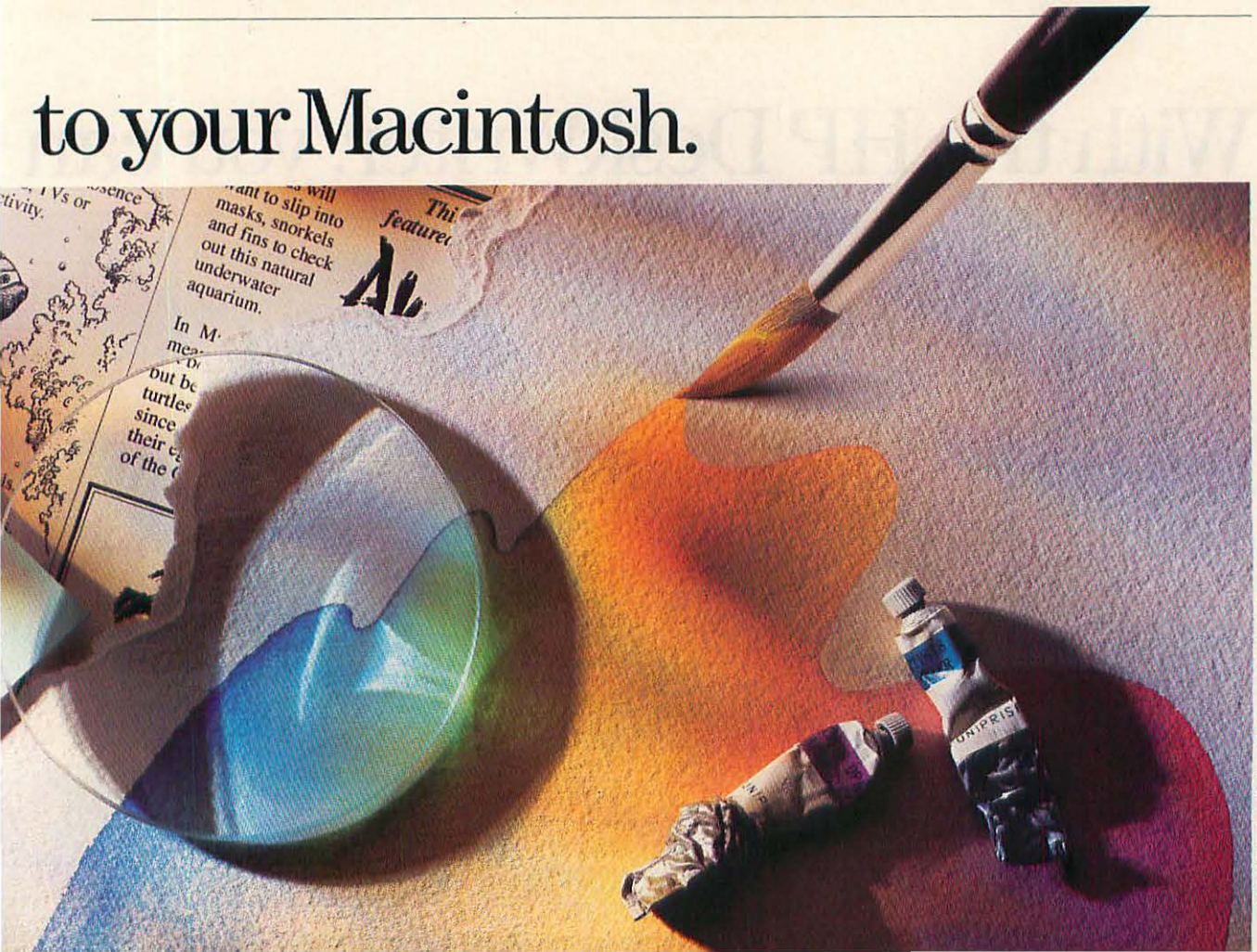
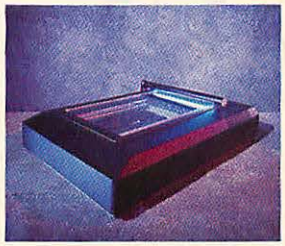
to your Macintosh.



©1990 Hewlett-Packard Company PE12012

art, negatives, gels, and text. $4500. XRS X-Ray Scanner, 213/608-3711.



OmniMedia Scanner

RAM Lite

Memory-expansion board for the Macintosh Portable fits into the RAM expansion slot. Uses true static RAM to conserve the Portable's battery power. 2MB $1395, 3MB $1995, and 4MB $2495. Daystar Digital, 404/967-2077, 800/962-2077.

Road E

Kit for converting a Macintosh SE or SE/30 into a 9-pound transportable. Kit includes 15-inch monochrome portrait-mode display monitor, interface board for SE or SE/30, Road E chassis and carrying case, 25-pin external SCSI connector, and all necessary components. NTSC driver, color display monitor, and Apple monochrome monitor available. Basic configuration $999. Macadam Computers, 415/863-6222.

Road E

Smart One Traveler

2400-bps battery-operated pocket-size modem that enables you to send faxes to any Group 3–compatible fax machine or PC fax board. An RS-232 pin connector attaches modem to any laptop or desktop computer. $299. Best Data Products, 818/773-9600.

SMR-2601R Monitor/Receiver

26-inch multimedia monitor and receiver designed for graphics, video, and imaging applications. Compatible with Mac II and VGA. Comes with infrared remote control for all functions, and a stereo audio system. Accepts and displays a wide range of input signals including NTSC composite video, Super VHS, CATV, and RGB analog. $2600. Mitsubishi Electronics America, 800/828-6372.

SMR-2601R Monitor/Receiver

SOFTWARE

AddCAD

Add-on package designed to run with VersaCAD permits viewing and manipulation of VersaCAD drawings. Operates within VersaCAD via pull-down menu that appears on the VersaCAD menu bar; contains Parallel Distance, Attribute Display, and Align tools. 2MB min. memory. $50. DickieSoft, 415/322-1138.

Add Motion

Extension to HyperCard 2.0 adds color-paint tools and

HP offers you the best things next

From input to output, Hewlett-Packard leads the way. With a full line of Macintosh-compatible printer and scanner choices.

For photographic-quality scanning, there's the HP ScanJet Plus scanner. Combine that with one of HP's high-quality printers. The DeskWriter, the LaserJet III, the LaserJet IIP, or the LaserJet IIID. HP even has color printers. The PaintJet and the PaintWriter XL.

Plus, HP stands behind all their products with exceptional service and support. And a one year warranty. It doesn't get much better than that.

There is a better way.

HEWLETT PACKARD

NEW PRODUCTS

Edited by Mary Margaret Lewis

This section covers Macintosh products formally announced but not yet evaluated by Macworld. All prices are suggested retail. Please call vendors for information on availability.

HARDWARE

5000CX Projection Panel

Color LCD projection panel comes with a hand-held remote control that lets the user control image quality from any position in the room. Weighs under 7 pounds and has a projectable range of nearly 5000 colors. $4995. In Focus Systems, 800/327-7231.

5000CX Projection Panel

ATS Convertible Model 2

Kit that provides a platform for assembling a Mac SE–compatible computer with an internal tape-backup unit, removable media drives, and two internal SCSI hard drives. Supports accelerators and large-screen monochrome displays. $400. Atlanta Technical Specialists, 404/292-6655.

Braemar SX150 Tape Subsystem

Braemar SX150 Tape Subsystem

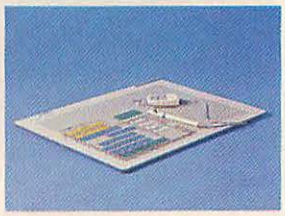
Tape subsystem for the compact Mac models and the Mac II family. Backs up 155MB of data on a single cassette in less than 25 minutes. Provides either file-by-file or mirror-image modes of file selection, and on-screen menus that guide the user through the backup process. $749. Braemar, 612/890-5135.

Genesis 6000i

Rewritable optical disk drive that comes with full partitioning support; GroupSets software for linking up to seven drives to form a single 2.2GB volume; password protection and data encryption; and diagnostic procedures. Compatible with the ANSI/ISO standards for optical drives and cartridges. Enables users to switch between 600MB and 650MB cartridges. $5495. Macsetra Technologies, 306/934-6044.

GraphicMaster

Digitizing tablet that has 1000-lines-per-inch resolution, pen-tilt correction for increased accuracy, and a small footprint. Requires no power supply of its own, and remembers configurations when the Mac is turned off. $795 with stylus and 4-button puck or 16-button puck without stylus. Numonics, 215/362-2766.



GraphicMaster

JetPort

Accelerator board designed to reduce the time it takes to print documents that are dense with graphics. For single users, provides a direct connection to a LaserJet IID or III; for multiple users, can be paired with an Extended Systems 2098A or 2398A printer-sharing device. $195. Extended Systems, 208/322-7575.

LaserFrame

Cartridge-based 650MB storage system designed for graphics professionals. $6499. SuperMac Technology, 408/245-2202.

MacIO-48 IO Board

Parallel I/O board for the Mac provides 48 TTL digital I/O lines organized as six 8-bit ports for the Mac II, and transfer rates of up to 300K per second. Uses 50-pin Canon-type female connectors and in-ROM drivers that automatically recognize sisterboards. $425. Axon Research, 201/218-0739.

MacJukebox

Infrared interface box that connects with a Mac Plus or later model Mac to automate operation of infraredcontrolled household items, such as remote-control devices. Controllers menu lets you consolidate remote transmitters into one or more unified controllers with labeled buttons; Channels menu lets you organize television and radio channels, security, lighting, and sprinkler systems; and Jukebox Menu lets you organize, sort, select, and play CDs and albums. $599 for Infrared Interface Box, software, cables, and manual; $1899 with a Mac Plus. DanCraft Enterprises, 213/643-8782.

OfficeStar

Software-driven sharing device connects up to seven computers or serial devices for printer and file sharing via LapLink, DeskLink, or LapLink Mac software. Starter kit $199. Traveling Software, 206/483-8088.

OmniMedia Scanner

24-bit, 300-dpi, full-color scanner that also works in 8-bit gray-scale and single-bit line-art modes. Inputs photographs, 35mm slides, transparencies, X rays, line

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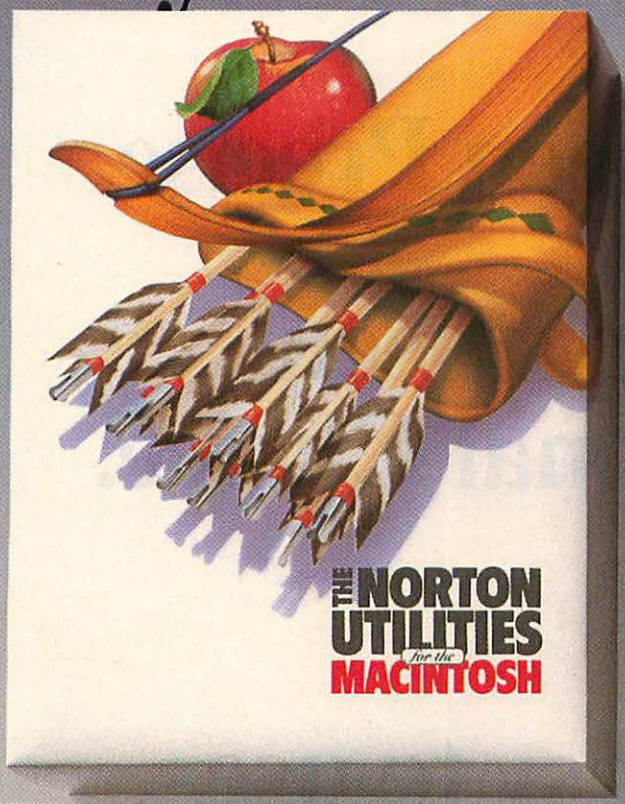
Any resemblance to other Macintosh utilities is pure coincidence.



If that sounds like an outrageous statement, it sure is.

But then, this is one outrageous set of utilities.

In fact, comparing the Norton Utilities® for the Macintosh® to anybody else's utilities for the Macintosh is, well, kind of embarrassing.

Because when it comes to fixing your disk problems, rescuing your data and daily getting the utmost from your Mac,® nobody else even comes close.

Why you need a Doctor in the house.

To see what we mean, see what happens when you call up our revolutionary *Norton Disk Doctor.*®

Which is what you'll do whenever you're having trouble doing things like booting your system, recognizing or reading disks, opening, closing or trashing folders, locating icons or launching applications.

The Disk Doctor automatically diagnoses and repairs the 45 most common—and dangerous—problems your disk can confront you with.

Including a whole bunch of things the other guys can't even detect, let alone repair.

Which is one reason why—unlike other programs—we don't display hair-raising messages warning you of the "Risk of losing data" from using our utilities.

We save your trash.

Of course, any time a human being uses a computer—yes, even a Mac—there's a risk of losing data.

Which is why, seven years ago, Peter Norton Computing invented the legendary *UnErase.*®

Like the rest of the tools in this box, UnErase has been designed expressly for the Mac, to recover more kinds of trashed files, more quickly and with less effort on your part than any other program.

UTILITIES
- Norton Disk Doctor
- UnErase
- Speed Disk
- Format Recover
- Norton Disk Editor
- Directory Assistance
- Layout Plus

DESK ACCESSORIES
- Fast Find
- KeyFinder

CONTROL PANEL DEVICES
- DiskLight™
- FileSaver
- Volume Saver

You can UnErase by File Type. By Text Search. Or use Quick UnErase to scan your fully loaded hard drive in as little as five seconds.

(You don't even want to know how long it takes everybody else.)

Whether your drive is fully loaded or nearly empty, *Speed Disk*™ is—here we go again—the quickest, easiest and safest way to dramatically accelerate disk access.

And unlike other programs, Speed Disk won't lose your data even if your Mac loses power.

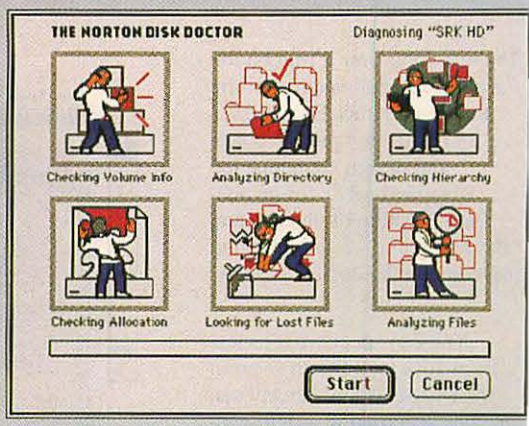
What a find.

Of course, you don't have to lose your data to want to get at it as quickly as possible.

That's something you want to do every day, every time you open a file.

So you'll be interested to know that *Fast Find* locates and opens files so quickly, you may never use the Mac's standard Find File accessory again.

If all of this looks too good to be true, see your favorite software dealer for a demonstration.



The remarkable Norton Disk Doctor automatically diagnoses, reports and repairs the 45 most common—and dangerous—disk problems. It even tells you when it's time to run our Speed Disk utility and optimize your Mac's performance.

If you haven't got a favorite software dealer, call us right away at **1-800-343-4714 Ext 703G.**

We'll send you more information.

Peter Norton COMPUTING

We rebuild your reformatted hard disk in a mere nine seconds. That's 52 times faster than the "competition."*

Total times to recover a reformatted 40MB Quantum internal hard drive on a Macintosh IIcx with respective volume information files installed.

© 1990 Peter Norton Computing, Inc. 100 Wilshire Boulevard, Santa Monica, CA 90401-1146. All rights reserved. Macintosh and Mac are registered trademarks of Apple Computer, Inc.

Circle 141 on reader service card

It's always been Powerful.

It's always been Precise.

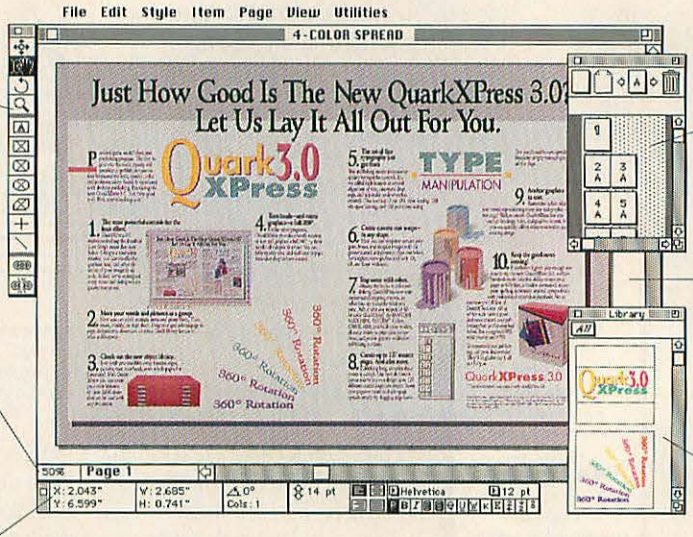
It's always been the Professional Choice.

Now it's easy to use.

The new tools you'll find on the moveable Tool palette are: the Polygon Picture Box tool for multisided picture boxes and design elements; the Rotation tool for manual 360° rotation of objects; and the Zoom tool for enlarging or reducing the document view.

You can specify page view from 10% to 400% in .1-point increments. View percent can be specified in a field with mouse clicks or by clicking and dragging with the Zoom tool selected.

A variety of specifications—such as font, size, style, leading, location, angle of rotation—are displayed for text boxes, picture boxes, and lines. You can change values interactively on-screen without using a menu or dialog box.



Creating multiple-page documents is easy with a new palette that enables you to insert, delete, and move pages graphically by dragging page icons.

A pasteboard lets you position pictures and text off the page, create bleeds, and design multipage spreads up to 48" × 48".

Library palettes provide an easy way to store text and graphics. You can copy and paste or drag items from an open library onto a page and between open libraries.

QuarkXPress®

The Choice for Publishing Software Worldwide

Visit your local dealer and experience the power, precision, and ease of QuarkXPress for yourself.

Circle 295 on reader service card

LUIS DELGADO

Kevin Corcoran, principal and owner of Pacific Media Center, beta tests the high-end Video F/X videotape editing system in his studio in Santa Clara, California.

to ship in August. For more information, contact Qume in Milpitas, California, at 408/942-4000.—**T.M.**

Video F/X Links Video Editing and PostScript

Video F/X is a desktop videotape editing system that lets you overlay encapsulated PostScript graphics created in many popular paint programs. Designed by high-end video production vendor Digital F/X, the Video F/X system also includes a powerful help and instructional stack to help Mac users learn the ropes of video editing. The product is intended for professionals who have used video in their work but have not previously produced video.

The core of the Video F/X system consists of a NuBus board integrated with video-editing software. Users add two VCRs and an NTSC monitor. A minimum system also requires a Mac II series CPU, 8MB of RAM, a 40MB storage device, an 8-bit RGB monitor for the Mac, and System 6.0.5 or higher.

One of the more interesting features of the system is that it provides accurate time-marking of the video frames, using only conventional VCRs. The company achieves this by remixing the two (stereo) sound channels into one (mono) channel, freeing up one of the sound channels to carry the timing information. The time-marking makes it much easier to find a specific series of frames or to index an entire videotape accurately.

The company estimates that the desktop editing system can be put together for about $22,000 to $23,000, including the Mac. The Video F/X and its software will list for $9995. The product is scheduled to be available in October. For more information, contact Digital F/X in Mountain View, California, at 415/961-2800.—**T.M.**

3-D Goes between the Scenes

When Adam Lavine and Dennis Chen used the Mac to create two videos for the National Science Foundation, they found that Mac animation software wasn't as easy to use as they had hoped. So they wrote their own. The result, Infini-D, is a photorealistic 3-D modeling and animation program for the Mac.

Infini-D's ability to interpolate between a start frame and an end frame for everything it animates can create some unusual effects. Besides light sources and cameras, it also interpolates between rendered objects, so that as a camera zooms over a crystal wine glass and the point of view and the lighting change, the wine glass could also be changing—perhaps into a marble vase.

Objects, lights, and cameras can move in straight lines or, for more fluid motion, over spline-based paths. Editing tools like Infini-D's sequencer enable users to combine multiple animated images in a frame. You can cut and paste between animations, stretch animations over time, and shoot scenes through multiple cameras.

You can link individual objects hierarchically so that when one moves, others move with it—the way a real ball joint would move, for example. Infini-D publisher Specular International says it is working on a "glue" type of linking for future versions of Infini-D that will make interactions between objects more flexible.

Infini-D's rendering abilities range from wire-frame rendering to flat shading to full-blown ray tracing. Pattern mapping, texture mapping, and light-source mapping are available. Users can choose patterns and textures from a library containing surfaces such as metal, wood, and marble; create their own surfaces in Infini-D; or import PICT images and map them to objects. Patterns created in Infini-D have what Specular calls true textures: if you drill a hole in a wooden plank, the wood grain shows inside the hole. A user can also set Infini-D to render a

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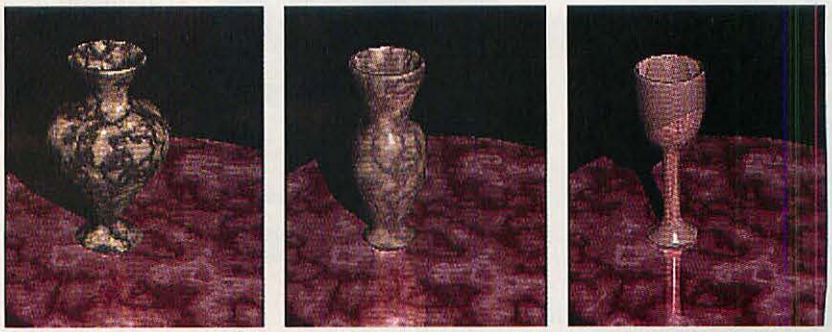


Infini-D can generate the in-between frames as one model becomes a completely different model—even with different rendering parameters and seen from different viewpoints.

The database that helps Federal Express® deliver buildings overnight.

Ric Honey, a project manager of new construction for Federal Express, knows a little about deadlines.

"People say to me, 'We need this building next month.' I say, 'But that's a 1-year project.' They say, 'OK, 3 months.'

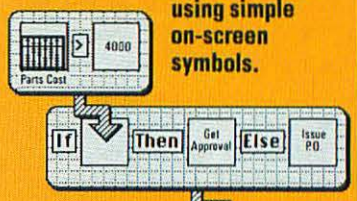
"Managing 4 or 5 projects like that can mean a paper trail of over 600 forms at a time. All with pen and paper. I knew I had to do something."

So Ric looked into a database program for his Macintosh.® "I chose Double Helix® because I didn't want to learn a programming language.

"I had a spreadsheet, and I knew it could do 'macros.' But *I* couldn't. If I could tell it in English what I wanted, fine. But I'm an awful typist. One finger. Try doing macros with that!

"When they told me about Double Helix, I said 'You mean I don't have to read anything? All I do is drag around icons, pictures? This is great!"

Only Double Helix lets you manage information your way, using simple on-screen symbols.



"Double Helix makes sure all the big expenses come up for my approval."

Now Ric and his team run the Double Helix multi-user application he created. He reports it's already cut 25% off his paperwork time.

"I just tell Double Helix what I want. And I get it.

"I wish my whole life was like that!"

For a Double Helix brochure or test flight kit, call Odesta now at **1-800-323-5423**. (In IL, 312-498-5615.) Current users, ask about our special upgrade offer.

© Odesta Corporation, 4084 Commercial Avenue, Northbrook, IL 60062 © 1989 Odesta Corporation. Double Helix is a registered trademark of Odesta Corp. Macintosh is a registered trademark of Apple Computer, Inc.

Double Helix®

Circle 352 on reader service card

file as a 32-bit image even on a Mac with 8-bit video.

Infini-D imports Swivel 3D and DXF files; it exports PICT, TIFF, Scrapbook, PICS, and RenderMan Interface Bytestream (RIB) files, though it lacks an interface for setting RenderMan shader parameters. It will list for $895. For more information, contact Specular International in Amherst, Massachusetts, at 413/256-3166.

—Brita Meng

GCC Unveils Film Recorder and Removable Hard Drive

GCC Technologies has introduced a color film recorder and a removable hard drive that's only the second to use the new Ricoh mechanism. The UltraDrive 50R is said by GCC to be more reliable than drives incorporating the popular Syquest mechanism because the Ricoh cartridge has a better seal against contaminants.

The drive stores up to 50MB of data on a single cartridge, and the cartridges work in the other Ricoh-based drive. GCC bundles disk utilities, print-spooling software, an envelope-printing desk accessory, and 3MB of shareware with the drive. The UltraDrive 50R has a retail price of $1299 including one cartridge. It was slated to begin shipping by the end of August.

GCC's ColorFast film recorder, based on a Polaroid design, can render a high-quality slide in about 2 minutes with 2048 lines of resolution. A professional-quality mode takes about 4 minutes per slide, the company says. The recorder also has draft and preview modes. Available beginning in August, the ColorFast recorder has a list price of $5999. For more information, contact GCC Technologies in Waltham, Massachusetts, at 617/890-0880.—**T.M.**

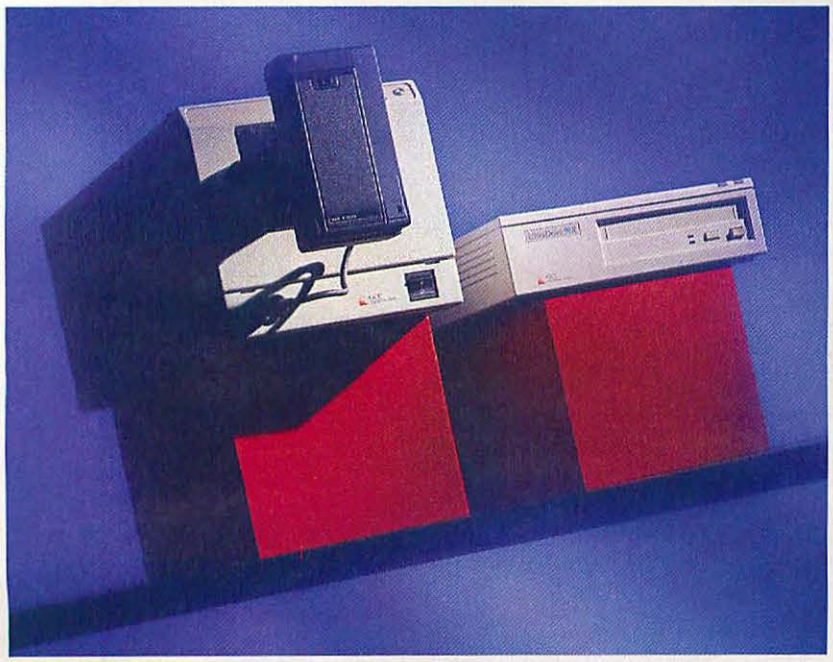
Macs Go to Wall Street

The newest instrument on Wall Street is MarketMax, a Mac-based trader program. MarketMax helps securities traders keep on top of the market, with continuously updated real-time information on stocks, options, futures, futures options, and corporate bonds on all U.S. exchanges. According to MarketMax publisher TriStar Data, there are about 250,000 desktop quotation machines in the United States, but only about 50,000 of them are PCs, and few of those are Macs. Most traders use Quotron dumb terminals, which have few customization features and don't update automatically.

With MarketMax, traders can create windows with a specific set of instruments; configure what information is displayed; and display information in multiple colors, fonts, and sizes and in decimal or fraction format. A set of windows (for example, a client's portfolio) can be saved as a separate file.

MarketMax features a block ticker (listing trades by units of 10,000 shares), Dow Jones News/Retrieval service, and market diaries. All of these can be viewed concurrently while quotes are updating. MarketMax delivers data in real time from the Telekurs Ticker IV, which now covers 25 American exchanges and will soon include Canadian, European, and Japanese exchanges. MarketMax comes with the

(continues)



MARK JOHANN

GCC's ColorFast film recorder (left) can make a high-quality slide in 2 minutes. The UltraDrive 50R removable hard drive (right) uses a Ricoh drive mechanism and sealed media.

VIRUS WATCH

Current viruses, Trojan horses, and worms affecting the Macintosh community.

Unnamed PostScript Hack

Type: Trojan Horse
First listed in Virus Watch: 11/90
Info: Disables PostScript printers; requires replacing a chip on the printer's system board.
Impact: Destructive.

MDEF (a.k.a. Garfield)

Type: Virus
First listed in Virus Watch: 10/90
Info: Bears no resemblance to WDEF.
Impact: Nondestructive. Can cause crashes; infects both System file and applications.

Steroid

Type: Trojan Horse
First listed in Virus Watch: 10/90
Info: Steroid is a disk-destroying INIT circulated with the false claim that it speeds up QuickDraw on Macs with 9-inch screens.
Impact: Destructive.

Anyone who encounters a new software virus is urged to contact Dan Littman at *Macworld News*, 415/978-3209.

ULTRA 96

V.32/V.42bis

HayesConnect

Since it was introduced, our ULTRA 96 has become the fastest-selling Hayes modem ever.

Not only because the move to high-speed modems is in full swing, but because no other 9600 can deliver the features, performance, and networking capabilities of the fully loaded ULTRA 96.

ULTRA 96 provides up to 4-to-1 data compression, so it can save you money by letting you run computer equipment at its maximum speed.

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It's available bundled with HayesConnect™ network server software, so any user on an AppleTalk® network has access to ULTRA™ performance.

Of course, ULTRA 96 also works on dial lines, leased lines, and satellite links, and it's ideal for AppleTalk bridges. It even automatically negotiates the best connection with other modems. Hayes or otherwise.

Plus, it uses the world standards for error-control and data compression, V.42 and V.42bis, and it can downshift to MNP® levels 2 through 5.

What's more, ULTRA 96 is compatible with the most popular high-speed modem on the market. The Hayes V-series® Smartmodem 9600.™

And with its low sticker price, you'll also find it compatible with your budget.

For more information about ULTRA 96, call 1-800-635-1225.

We think you'll find it to be the ultimate communications machine.

Hayes. *Our technology has the computer world talking. More than ever.*

At 38,400 bps, and the way it runs on the network, no other modem can keep up with it.

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AppleTalk is a registered trademark of Apple Computer, Inc.

Black-Sholes market-analysis model and supports proprietary models written in Pascal or C. MarketMax has hot links to the spreadsheet Wingz and comes with a Wingz template for pricing a portfolio; more templates are planned.

A MarketMax installation includes a modem link to TriStar's offices, where the Telekurs data is retransmitted. The system requires two SE/30s or equivalent Macs as file servers, one static server that manages fundamental and historical data, and one dynamic server that oversees data that changes many times a second. Installations with more than 100 Macs require another pair of servers.

MarketMax pricing starts at $400 per workstation per month and goes down for larger installations. For more information, contact TriStar Market Data in San Francisco, at 415/627-2345. **—Jonathan Cassell**

ROBERT HOLMGREN

Just a few floors above the offices of TriStar Market Data where MarketMax was developed, traders at Montgomery Securities are putting the real-time stock terminal to the test.

Oasis in the Jungle

The Macintosh color paint market is becoming as complex as a jungle ecosystem. Time Arts, a leading color paint developer for IBM PCs, is migrating to the Mac to further upset the balance of nature.

Time Arts' Mac product is called Oasis. In combination with a pressure-sensitive Wacom tablet, the program lets you use pressure as another element of Oasis's tools. For example, you can widen and narrow a paintbrush as you bear down and ease up on the Wacom's stylus, change the color density, change the proportion of colors as they mix together in a stroke—or combine several of these pressure-sensitive attributes at once.

About 20 brushes provide different effects like chalk, oil paint, colored pencils, and so on. A special selection feature lets you select and create masks using any tool, even text; image processing has about 15 effects and provides a preview box; and in the color palette you can create and compare a series of color gradients or paste in a piece of color from another source and use it as a palette.

Oasis can drive scanners and, with a Truevision NuVista board, video devices. (Time Arts will support other boards as they become available.) Oasis can send antialiased text out on the alpha channel to overlay titles on video, and for production houses, Oasis can send out a mask for use with a linear keyer to overlay video from multiple sources. The program's color palette also provides an optional video-legal constraint on color saturation.

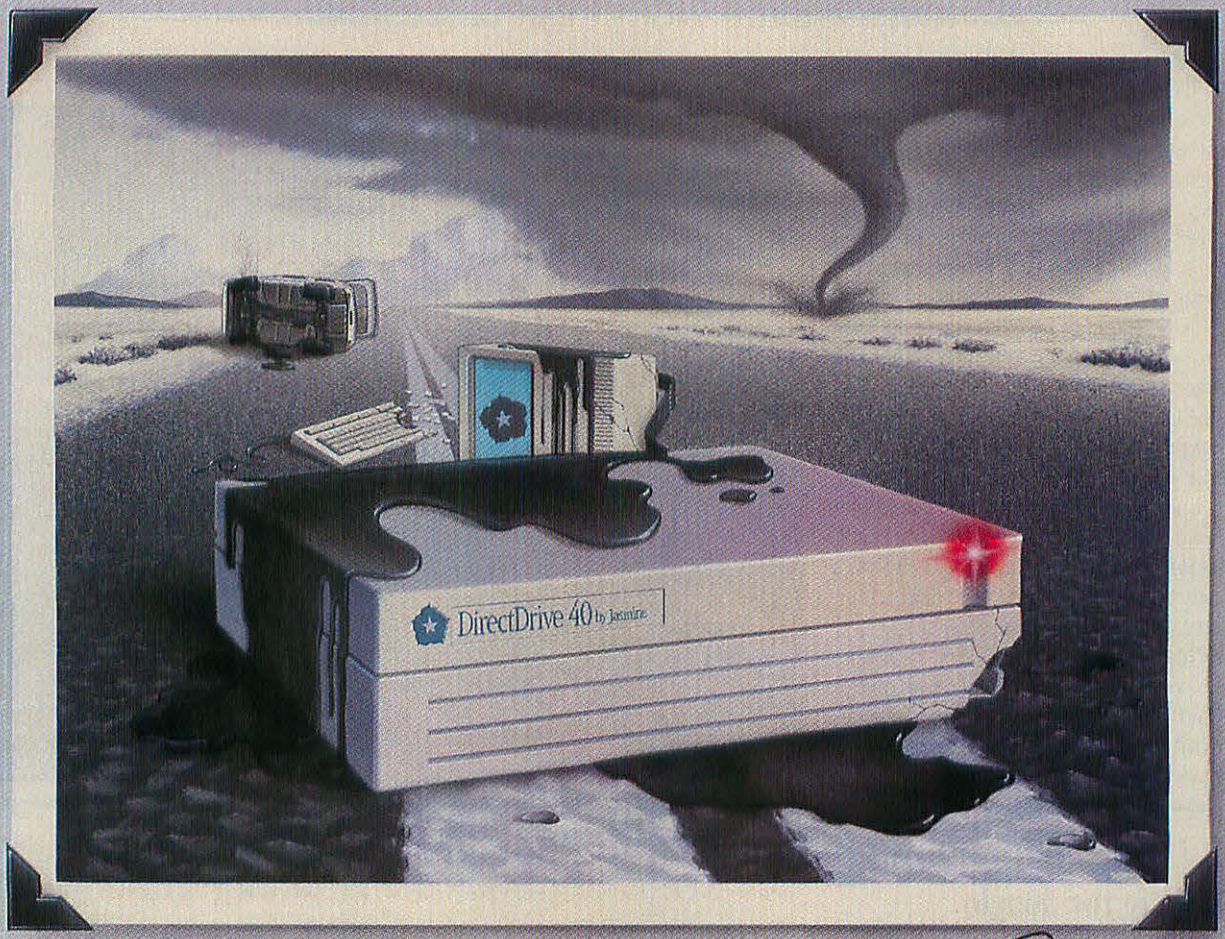
The next version of Oasis is already in the planning stages. Among its features will be objectlike layering, which will make possible multiuser paint documents, and an eraser that works like a real eraser by only wiping away the top color instead of taking off everything down to the background; user-modifiable textured papers will interact with the paint tools like real paper, perhaps absorbing ink quickly or scraping off more chalk.

Oasis will list for $795. For more information, contact Time Arts in Santa Rosa, California, at 707/576-7722.—**D.L.**

(continues)

JOHN DERRY

This mixed pastel and colored-pencil look shows the softer side of Oasis. In addition to its subtle paint tools, Oasis has video-titling and -mixing tools.



You Can Count on Jasmine!

Dear Jasmine Technologies,

Occasionally we win one.

On 11/15/89, as I was driving home from work, a tornado formed just to the west of me. I had enough time to pull into a safe parking lot and duck down. The "safe parking lot" turned out to be right in the path of the tornado. I was knocked out as the 200 MPH winds struck, flying my car—and me—nearly 300 yards. I woke up in the hospital with a severe concussion and blood loss. As part of the $250 million storm damage, my car was totalled and my computer was lost.

After I was released from the Hospital, my wife and I went to the Police Station where some "valuables" had been rescued from the disaster scene. There was my Macintosh SE with its Jasmine drive. The hardware was in sad shape; the front SE surface was bashed in, there was a big piece missing from the Jasmine Drive, and both were coated with a mixture of motor oil, antifreeze and water. The insurance company agreed that it was a total loss. But, realizing that the damage was finite, I began cleaning and straightening out everything. I jokingly powered up—IT WORKED! The bashed-in Jasmine drive booted the straightened out SE giving me a happy Mac, displaying the partitioned icons and sat there waiting! The clock was even right! So far, the drive has yet to fail.

I'm writing this letter (on the Jasmine drive) of appreciation to all of you in hope that you will be as pleased as I am that your products survived the forces of a major tornado that was blowing manhole covers around like frisbees. I don't have the foggiest idea where the drive ended up, but judging from all the junk coating it, it must have been found under one of the piles of destroyed cars.

In summary: the car was totalled, I was almost totalled, but the Jasmine drive made it O.K. Congratulations on making some darn good stuff. I plan to take the scarred hardware to work and continue to use it there as a reminder of one of the positive aspects of that unfortunate experience.

Sincerely,

Eugene K. Lawson

Gene Lawson

The New Jasmine...

For the last four years Jasmine has continuously been the leader in the Macintosh hard drive market. We're proud to announce that we are now a division of Chess, a dominant force in the European Macintosh market. With our new management we are producing the kinds of innovative products that we've become known for.

Look at the Service...

Jasmine's Platinum Flower Service is focused on our Customers. Over 25% of our staff is dedicated to Customer and Technical Support. Each Jasmine drive is thoroughly burned in and tested before shipping and we include informative manuals and detailed troubleshooting guides to help with any problems that may arise. If you're not satisfied with <u>any</u> aspect of your drive, you have 30 days* to return it for a full refund and, should your drive need help, the Platinum Flower line has a 2-year repair warranty.

Don't Take Our Word for it...

Jasmine Technologies has consistently finished first in the MacUser Labs' Buyers Guide and we've been praised in every major Macintosh publication for the quality of our drives and for the ease of use of DriveWare, our custom drive utility. Jasmine has earned more MacWorld and MacUser awards for Macintosh peripherals than <u>all</u> of our competitors combined.

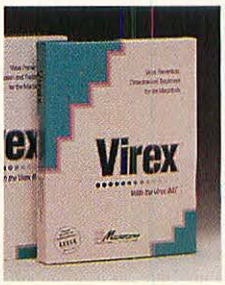
Now, Consider the Alternatives...

Go ahead, check out the competition. We could use cheaper parts and have the same kind of "too good to be true" prices as some drive makers, but remember, if it sounds too good to be true, it probably is. We'd rather spend a little more, *not* cut the corners, and produce a premium drive at a non-premium price. We've set the standards and we will continue to lead the industry now and in the future. Simply put, there is no substitute for the best.

The Jasmine Edge...

A 70,000 hour meantime between failures. A noiseless fan with a filter. Two surge protected AC outlets and two power fuses. A SCSI select switch and two-color LED.

DriveWare, our drive utility, provides the best SCSI partitioning, password protection, error correction, diagnostic and help software.



Platinum Flower includes two award-winning utility software packages with every drive (Sum II and Virex) plus over 10 megabytes of Shareware and Freeware programs.

Blue Flower Line	
Capacity	Price
40 MB	$399
80 MB	$499

Platinum Flower Line	
Capacity	Price
40 MB	$499
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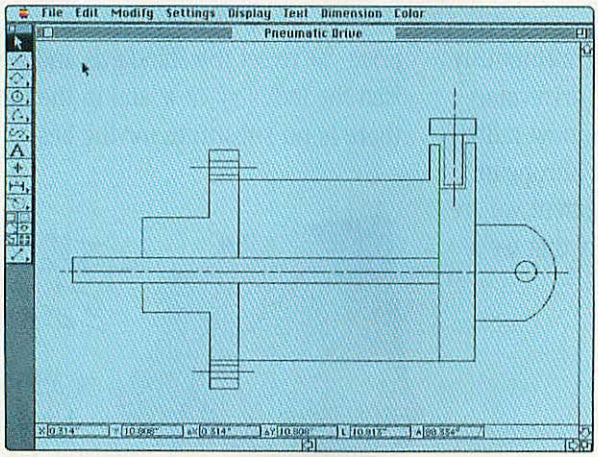

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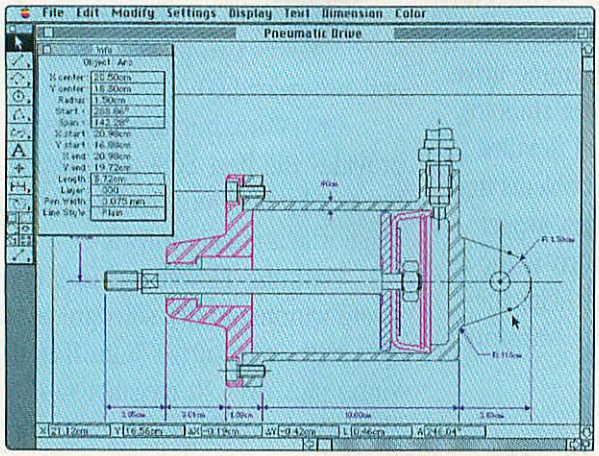

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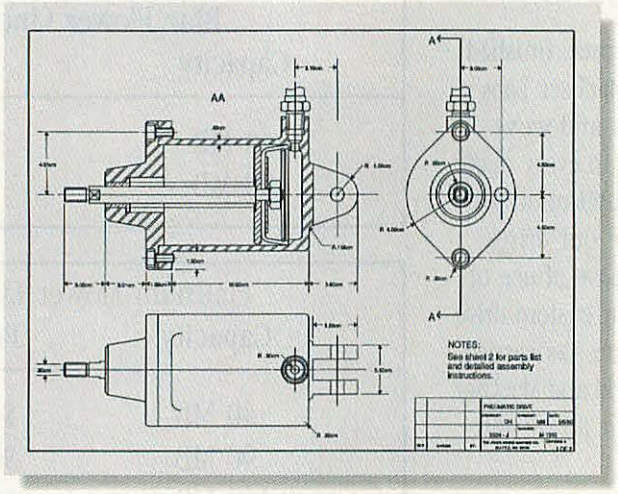
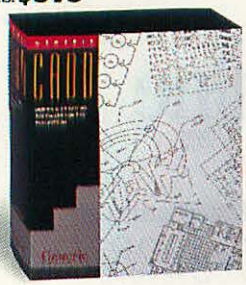


DONE.

U.S. **$595**



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Light Side of the Moon

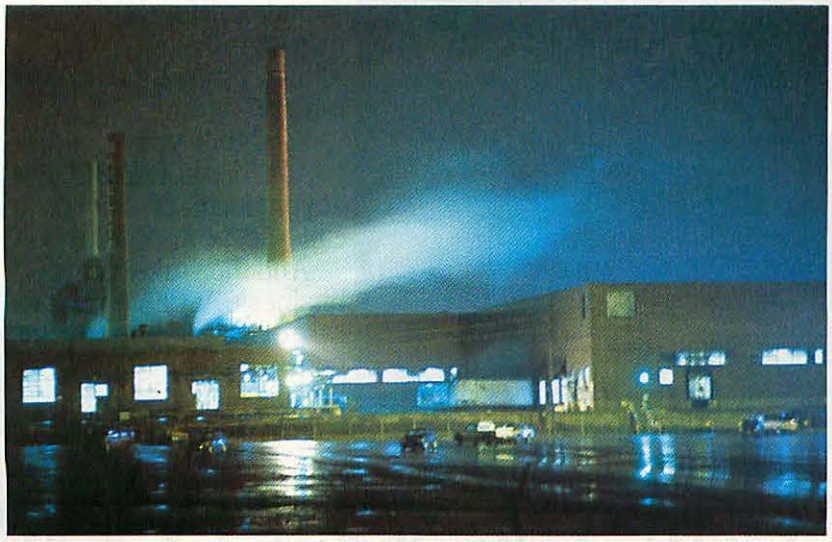
Will computers ever bring workgroups into perfect alignment? Syzygy, which bills itself as a project-tracking tool, tries to do that by distributing the responsibility for managing projects to everyone involved and by automatically informing the affected people of project changes.

Syzygy lacks some project-management fundamentals such as dependent relationships and resource leveling, and it doesn't display projects in network-diagram format or provide critical-path analysis. Syzygy's style makes it more suitable for groups of people sharing responsibility for many small overlapping tasks than for one manager administering a major project and handing out work assignments. As people make decisions about their work—changing a milestone date, or moving an assistant from one task to another—Syzygy calls up Microsoft Mail and sends off a message.

A Syzygy database, called a work map, is a three-level hierarchy—objectives on the top, then projects, then individual tasks at the detail level. Each level has a pop-up menu for switching to displays of information relevant to that level. For example, the budget view at the objective level generates a table of figures for all the projects, while a budget view at the project level generates a table of figures for all the tasks involved in one project. As people take on projects in a work map, they see the relevant information for those projects. You can create a wide range of sorting and selecting filters by combining date, task category, and job responsibility, and after executing a search you can then display the results in tables or Gantt charts; a report generator can combine budget, schedule, and other kinds of information.

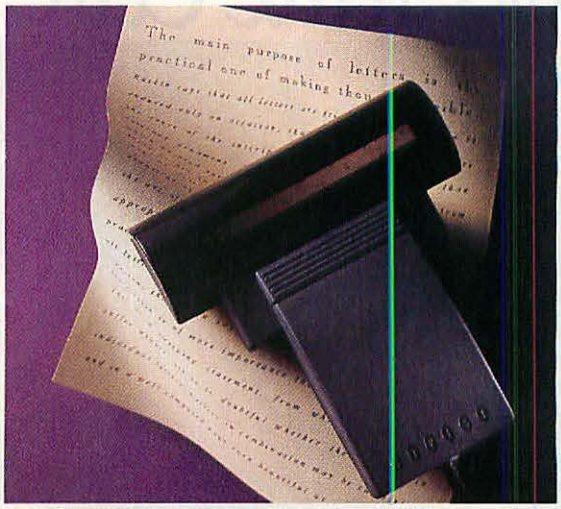
In its June 1990 issue, *PCWorld* panned the DOS version of Syzygy, but the magazine's two major objections—a difficult interface and weak E-mail—are resolved in the Mac product. The current product is an interim version written in 4th Dimension, largely at the request of Union Carbide, which is using the program to manage compliance with environmental regulations. Syzygy on the Mac can't share files directly with the DOS version, but a new version under development will be able to.

Syzygy requires Microsoft Mail (a QuickMail version is planned), and pricing depends on network configuration. For more information, contact Information Research in Charlottesville, Virginia, at 804/979-8191.—**D.L.**



VIRGINIA LIBERATORE

A Syzygy-using Union Carbide plant in Bound Brook, New Jersey. Integration of E-mail with project-tracking helps the chemical giant comply with environmental regulations.



MARK JOHANN

Caere's Typist Macintosh hand-held scanner and software let you enter data directly into spreadsheets.

OCR Package Enters Text Directly into Applications

Caere Corporation's Typist Macintosh is a combination of OCR (optical character recognition) software and a hand-held scanner that lets you put data directly into a spreadsheet or database, instead of having to paste it in after scanning and recognition. The Typist Macintosh software is an extension of Caere's popular OmniPage OCR software.

The hand scanner has a scanning speed of about 2 inches per second, slightly faster than most hand-held devices. It does not require a straightedge guide or a transparent overlay for positioning information. The Typist Macintosh software lets you magnify text while merging several scans into one document file.

Caere expected to ship Typist Macintosh beginning in September. The software and hardware together will have a list price of $695. For more information, contact Caere in Los Gatos, California, at 408/395-7000.—**T.M.**

Orange Micro Puts a PC in Your Mac

For those who want to run IBM-compatible software on the Mac, Orange Micro recently introduced its Orange 386, a 80386SX-based coprocessor board

(continues)

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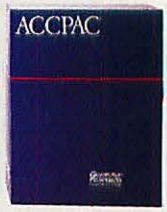

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for the Mac II family. The Orange 386 is a NuBus board that itself includes two PC AT–compatible slots so users can add a VGA graphics adapter board and display IBM-compatible software on a second monitor, for instance. It's also possible to add an IBM PC–compatible Ethernet board. The Orange 386 comes in two versions, one for DOS and the other for OS/2.

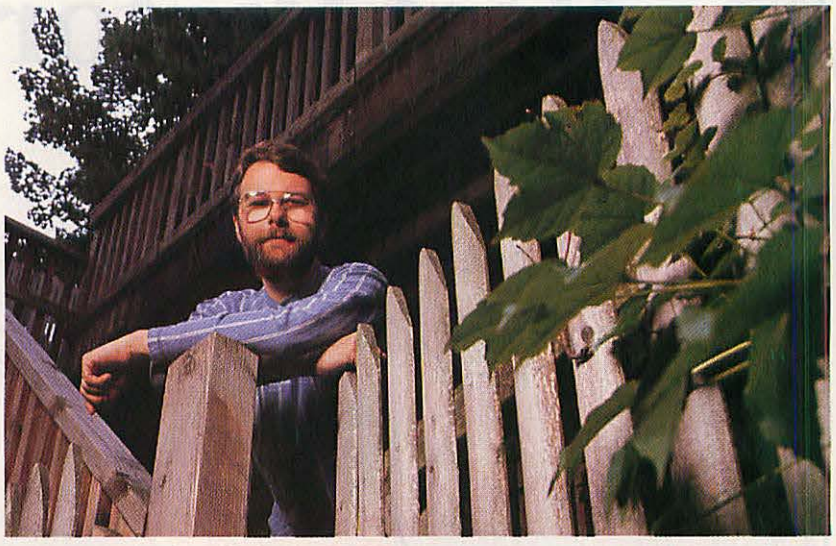
The Orange 386 includes a serial and a parallel port. The board can control a 1.2MB floppy disk drive or a hard disk drive with IDE interface. The coprocessor board has its own RAM, which is expandable to up to 16MB. Because the Orange 386 is essentially a complete system board, it can run DOS tasks completely independently of operations on the Mac system board, according to Orange Micro.

Due to space constraints inside the computer, users can only add half-size AT-compatible boards to the smaller Mac IIs, or three-quarter-size boards to the larger Mac IIs. The Orange 386 was slated for September delivery for the DOS version, which will retail for $2295. The OS/2 version was expected to ship in late fall at the same price.

Orange Micro also introduced the Orange 286, a similarly equipped 80286 coprocessor board for the Mac. It retails for $1859. For more information, contact Orange Micro in Anaheim, California, at 714/779-2772.—**T.M.**

MARK JOHANN

The Orange 386 is an IBM PC AT on a NuBus board, including a 386 processor and slots for AT-compatible boards.



BILL O'CONNELL

Resorcerer author Doug McKenna: "ResEdit doesn't go the length as a good Mac application . . . programmers are users too, and they gravitate to things that treat them well."

Resourceful Editing

New tools are being prepared for editing fonts, icons, menus, dialog boxes, and other resources used by Macintosh applications and system software. A beta version of ResEdit, 2.0b2, is out and Apple is developing a fully tested version 2.1, which should be available in January. Addison-Wesley is publishing the ResEdit manual as a paperbound book. A new company, Mathemaesthetics, is developing a ResEdit competitor called Resorcerer.

Resorcerer's main strength, according to its author Doug McKenna, is its editor for dialog boxes, alerts, windows, and control panels. Other editors in Resorcerer handle menus, string lists, custom resources, icons, and version resources. The program is also highly configurable. You can set many preferences and change the font and size of text used to display information, giving Resorcerer the look and feel of a custom Mac database program. McKenna says Resorcerer's user interface has won it popularity outside the United States, where developers often need to work in foreign fonts when localizing (translating) applications. Resorcerer will list for $256. For more information call Mathemaesthetics in Chestnut Hill, Massachusetts, at 617/738-8803.

ResEdit 2.0b2 is a prerelease version available to help software developers create programs for System 7.0. ResEdit 2.0b2 uses more icons in its Finder-like interface and has new editors for menus, icons, color icons, and bundles. For more information call the Apple Programmer's and Developer's Association (APDA) at 408/562-3910. ResEdit is also available without documentation from many user groups and from online information services such as AppleLink, CompuServe, Connect, and America Online.—**Lon Poole**

Iomega Shows Portable Bernoulli Drive

Iomega Corporation has introduced a portable and a transportable version of its Bernoulli Box removable disk drive. Both drives come in 44MB versions that use the same mechanism and media.

The Bernoulli Portable weighs about 14 pounds and includes a battery. The portable drive can run from its battery for 2 to 3 hours, according to Iomega. The Bernoulli Transport-

(continues)

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FoxBASE+/Mac: The Most Celebrated Mac DBMS Now Includes a Powerful Report Writer!

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New FoxBASE+/Mac Version 2.00 is here—and stealing the show! In its first year, FoxBASE+/Mac won more awards—both in the U.S. and Europe—than any other DBMS ever created for the Macintosh! And Version 2.00 is faster and more powerful than ever—packed with innovative new features and language enhancements!

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FoxReport lets you create virtually any columnar or free-form report—without *any* programming! FoxReport includes:

- **Page Layout:** Designate many layout settings for your report: number of columns, left margin setting, column width, space between columns, measurement size for each page, and more!
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- **Object Menu:** Control the Type Font, Sizes and Styles of text objects. Fill and Pen options let you change the color and shading of almost every object!
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After all, when it comes to the Macintosh, *Nothing Runs Like a Fox!*

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Circle 152 on reader service card

TOM GIBSON

The Iomega Bernoulli Transportable drive stores 44MB and weighs about 12 pounds. The 14-pound Bernoulli Portable (not shown) can operate from a battery for 2 to 3 hours.

able weighs about 2 pounds less and requires AC power for operation.

Both drives have the same footprint as a Macintosh SE, and both have a handle and have been ruggedized for transport.

The Bernoulli Portable has a list price of $2199 including carrying case. The Bernoulli Transportable lists for $1799 including AC adapter. Both are currently shipping. For more information, contact Iomega in Roy, Utah, at 801/778-6018 or 800/289-4031.—**T.M.**

Fires in the Valley

With nearly 400 local firms using hazardous materials, the Silicon Valley town of Mountain View, California, faces a constant danger of chemical fires and spills. For the Mountain View Fire Department, quick access to accurate information on companies and chemicals can mean the difference between success and failure in stopping toxic spills and fires; for the firefighters, it can mean the difference between life and death.

To help get that information more quickly, the department has turned to the HyperCard-based HazMat Administrator.

Many states require companies to file a hazardous-materials management plan with the appropriate county offices or the fire department; HazMat Administrator's companion program, HazMat Reporter, makes it possible to file such a plan on disk.

Government agencies using HazMat Administrator information can take HazMat Reporter format and calculate companies' fees for inspection and data handling; examine local statutes governing hazardous waste (HazMat's publisher provides state statutes and, where demand is heavy, local statutes as well); and print legal permits for handling toxic waste. When emergencies arise, fire departments can access information about company facilities; maps; chemical trade names; hazardous materials on the premises; names and phone numbers of company executives; and data on the neighborhood. If more data on chemical brand names is required, HazMat provides a trade name stack that is linked to the National Oceanic and Atmospheric Administrations' extensive Computer-Aided Management of Emergency Operations stack.

"A lot of decisions are based on what chemicals are stored at the site," says Gary Leinweber, hazardous materials manager for the Mountain View Fire Department.

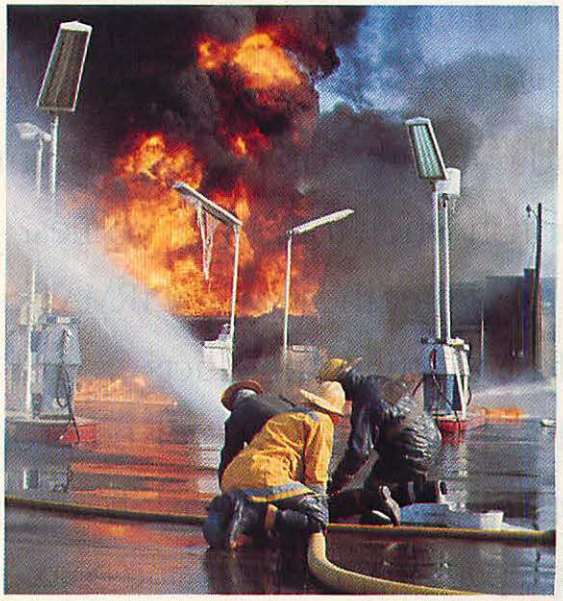
"We need to know what kind of protective clothing to wear, what kind of decontamination is required when a firefighter comes out, and when we can allow people back into the building. HazMat is a good early warning.

"We fought 153 fires involving toxic chemicals between June 1988 and June 1989," Leinweber said. "Ultimately, HazMat Administrator is going to come into play to save a life."

Other northern California areas are starting to adopt HazMat Administrator, including Apple's hometown, Cupertino.

HazMat Administrator costs $800, and HazMat Reporter costs $1500 for the first copy and $400 for each extra copy. For more information, contact Gaia Systems in Menlo Park, California, at 415/854-8288.

—**Jonathan Cassell**



FRANK OBERLE

Before attacking a fire, firefighters must know if they're facing burning plastics, radioactivity, or other extreme dangers.

Topas for the Mac Approaches

The fundamental principle for Mac software design is give the people what they want. When translated into products, that means let users manipulate the world inside the Mac directly by tugging on

(continues)

Do you have to avoid embarr

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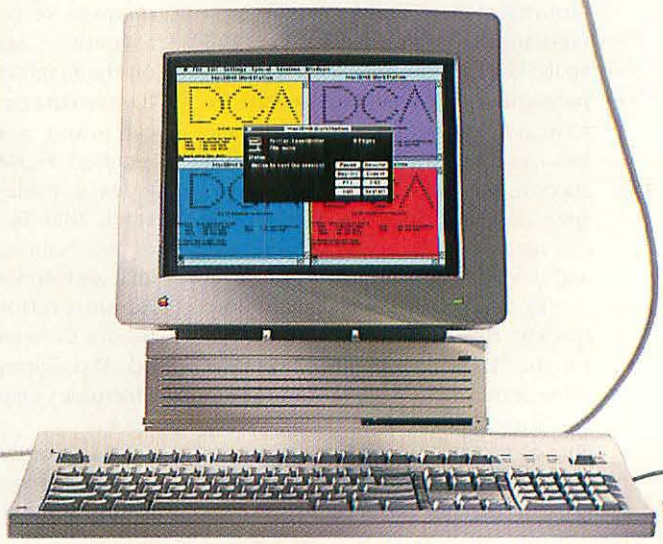
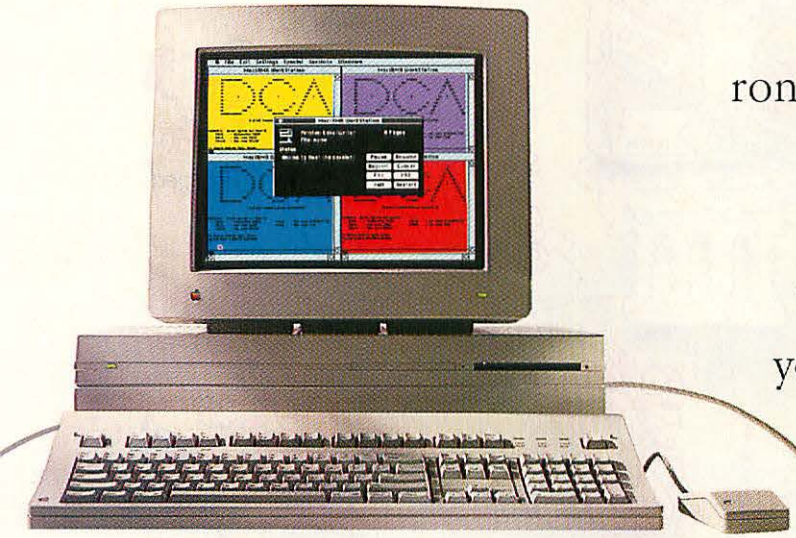


*Or call, 1-404-442-4500 ext. 61G © 1990 Digital Communications Associates, Inc. All rights reserved. DCA and MacIRMA are registered

the foresight assing hindsight?



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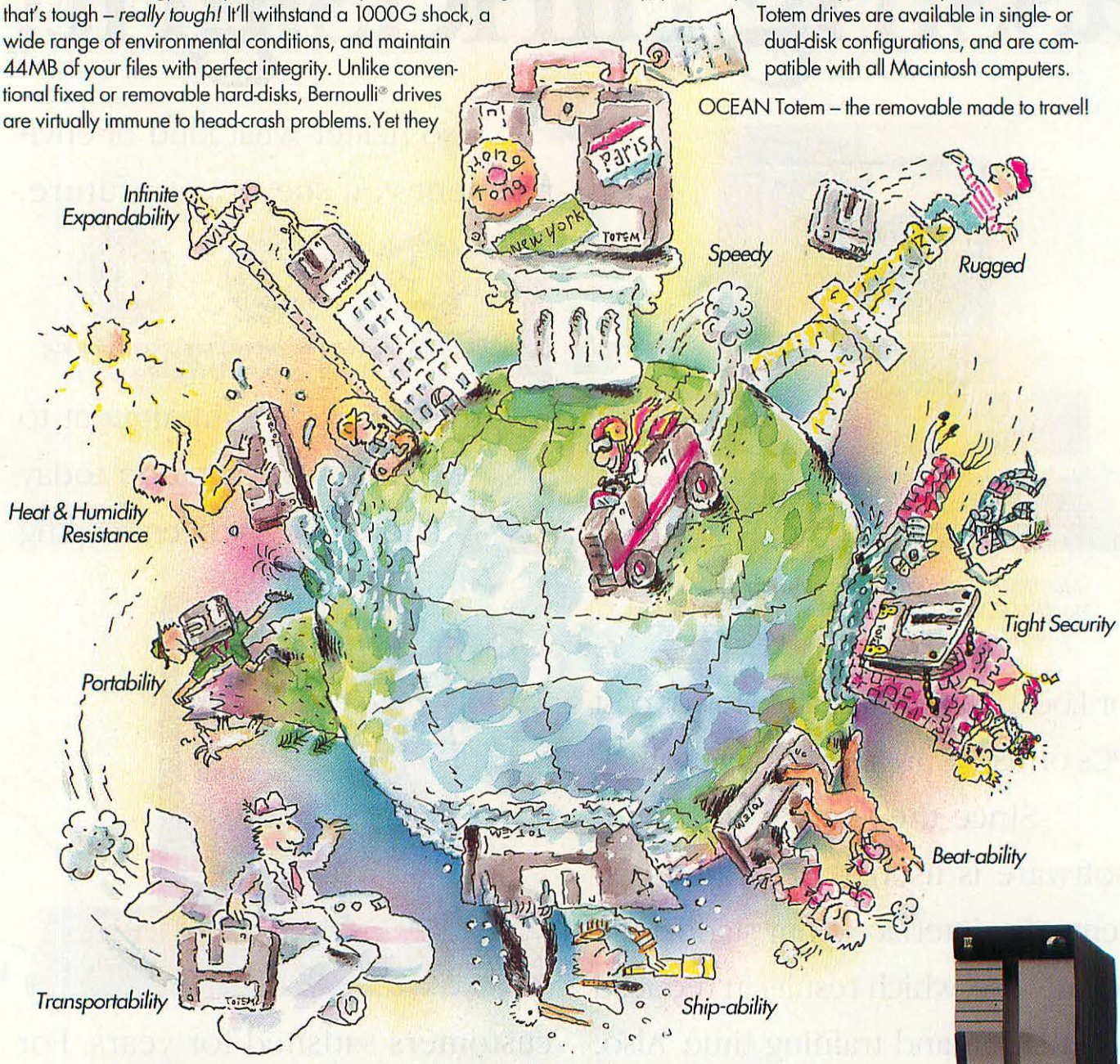

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LUIS DELGADO

At Base Two Computer Graphics in San Francisco, Paige Whitson is a longtime user of Topas on the DOS platform.

things with the mouse, and avoid modes that hem users in with a subset of the features they want to use.

Unfortunately, Mac modeling, rendering, and animation packages are miserably modal. In fact, those three functions are usually three applications. Mac developers will have something to learn when AT&T ships its Mac version of Topas. (Topas, a leading package on the IBM PC, is often called Topaz, though it stands for Three-Dimensional Object Processing and Animation Software.) In Topas, modeling, rendering, and animation are always available so that, for example, you can set rendering attributes or edit an object's shape in the middle of setting animation keyframes.

Topas has some very sophisticated tools. Its selection tool helps you pick out a point or line in a complex group of objects. You can drill holes through a 3-D object and switch tools in the middle of an operation—for example, from a straight line to an arc. You can also give text edges very complex bevels. (Topas will ship with some fonts, but broader font questions remain unresolved.)

Animation features include storyboard generation; cameras that revolve, dolly, track, pan, and tilt; and line graphs that let you observe or edit motion along the *x*, *y*, and *z* axes. You can control an object's motion through a curve with tension, which affects how tight the curve is, and bias, which subtly changes an object's velocity.

Topas's rendering capabilities support interlaced rendering (the NTSC standard requires two interlaced sets of 30 frames per second); rotoscoping, or mapping live video to 3-D objects and moving objects (this requires special hardware); and a full set of photorealistic rendering tools including RenderMan format output (but no ray tracing).

Topas will come in three levels, a low-end modeler for about $600 to $1000; a full-featured modeler for about $4000; and an animation package incorporating the high-end modeler for about $10,000. For more information contact AT&T Graphics Software Labs in Carmel, Indiana, at 317/844-4364.—**D.L.**

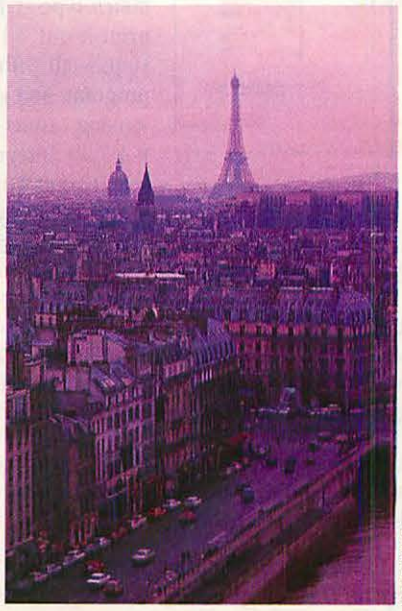
On the Streets of Paris

Poor Philippe. His girlfriend has thrown him out of their Paris apartment, and he has to find a new place to live. Fortunately, he speaks native Parisian French—which students must understand to help him in this interactive educational video game, A la Rencontre de Philippe.

With the help of a SuperCard program and a videodisc, students make their way through the streets of Paris. By clicking on a map, they choose the district where Philippe will begin his search. To help him find a new home, students listen to Parisian French spoken at conversational speeds by landlords, concierges, friends, and people on the street. They must also interpret answering-machine messages, newspaper ads, bulletin boards, and a Paris street directory. If students have trouble following the French, they can stop and replay it or call up French subtitles on the SuperCard screen on the Mac. If they don't understand a French word in a subtitle, they can click on it to bring up its definition, and if they still don't get it, they can listen to the dialogue on a second audio track that was recorded in a studio. Eventually they should understand the language as spoken because, as Mark Twain purportedly said, "No one in Paris speaks intermediate French."

Philippe's search can take numerous paths and has six possible endings. Students can work through the program several times, making different choices, and the outcome is likely to change as their comprehension improves.

The game was originally developed for IBM RTs and DEC MicroVAXes by Janet Murray, director of MIT's Athena Language Learning Project. A follow-up French disc is planned, Dans le Quartier St. Gervais, and Spanish-language discs are also in the works. It's likely that interactive games will ultimately replace much of the rote learning in language labs.



PETE SALOUTOS

Paris is beautiful—unless you're walking the streets looking for an apartment.

MIT is still looking for a publisher for A la Rencontre de Philippe and its SuperCard program, and a price has not been set. The package requires a Mac with 2MB of RAM, a laserdisc player, and a television or NTSC monitor. For further information, write (don't call) Janet Murray, director, Athena Language Learning Project, MIT, Room 20B-226, Cambridge, MA 02139.—**Ann Garrison**

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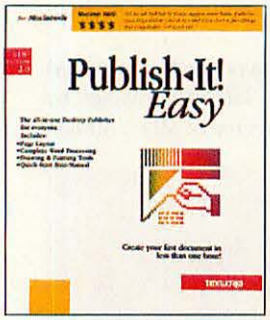

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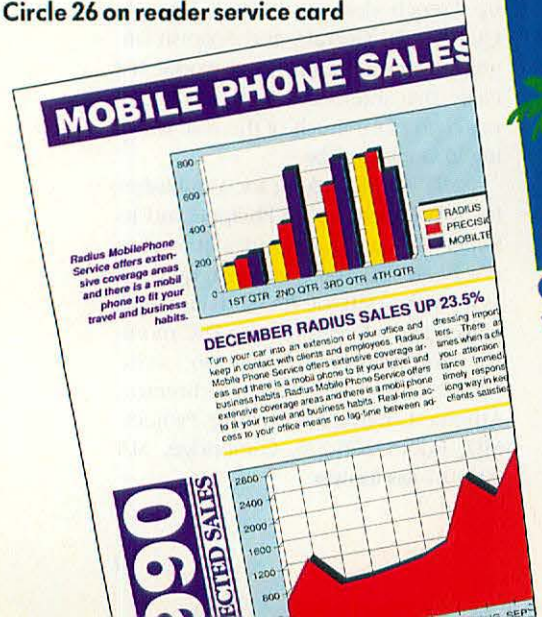

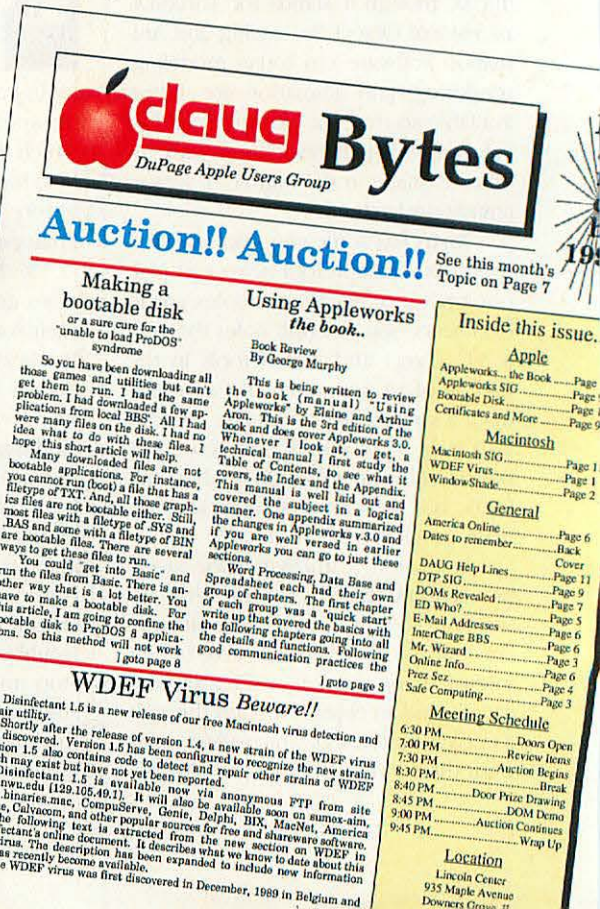

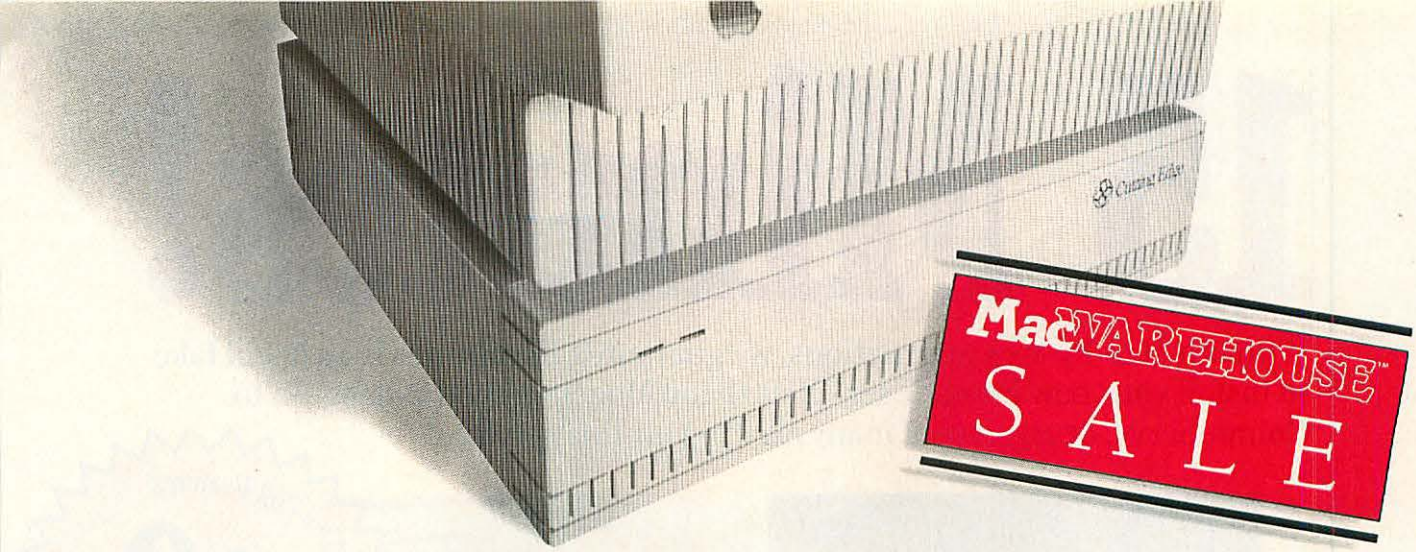

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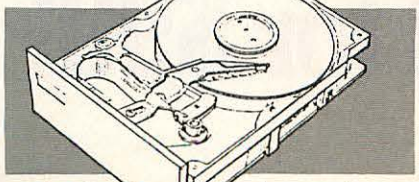

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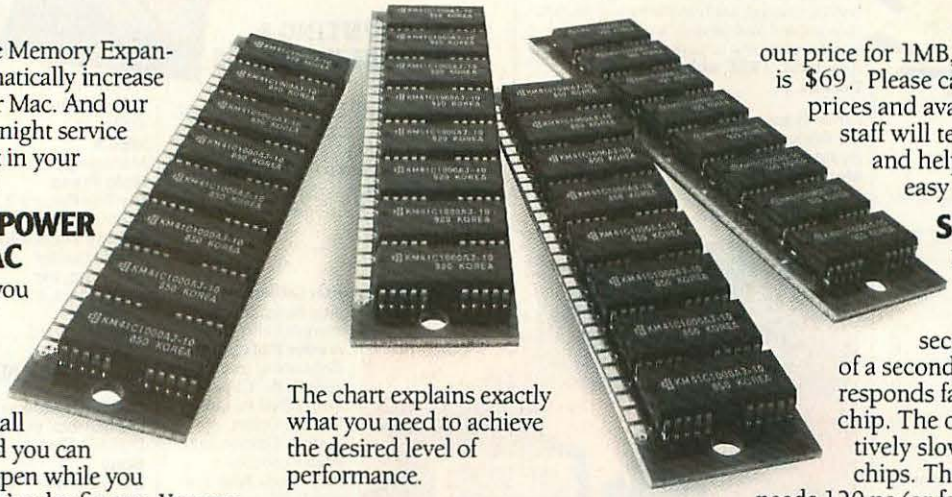

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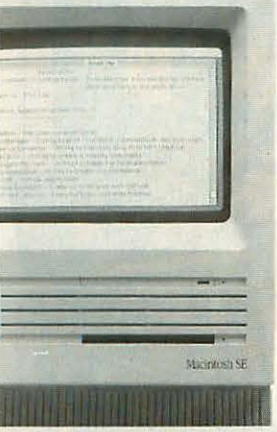

The chart explains exactly what you need to achieve the desired level of performance.

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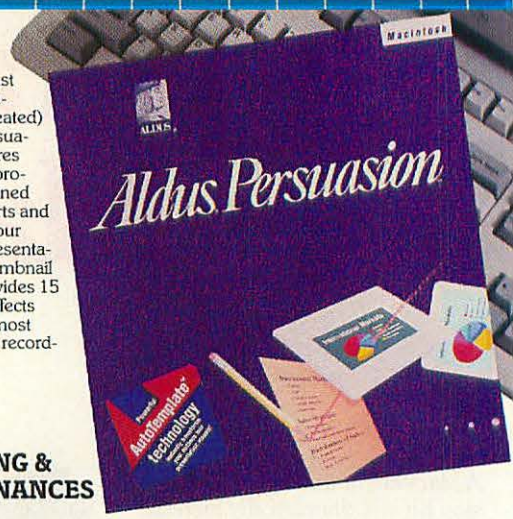

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Macinware SE Carrying Case ..... 75.
Monitorware Apple RGB Case ..... 79.
The Ultimate SE Carrying Case ..... 79.
The Neon Ultimate Carrying Case ..... 89.
Kensington
Anti-Glare Filter ..... 32.
Apple Security System ..... 34.
LaserWriter II Security System ..... 34.
MasterPiece Mac II ..... 105.

PowerBacker 360 UPS Line ..... 269.
SE Radiation Shield ..... 52.
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Absolute Solution
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Intuit
Quicken 1.5 ..... 35.
Layered, Inc.
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DS/HD (1.44 mb) ..... 24.

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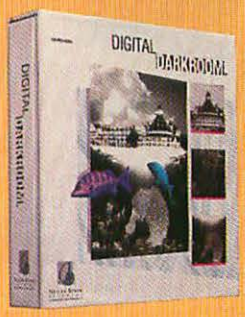

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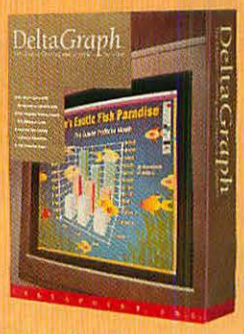

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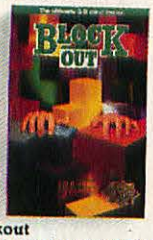

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FoxBASE+/Mac 2.0 ..... 292.
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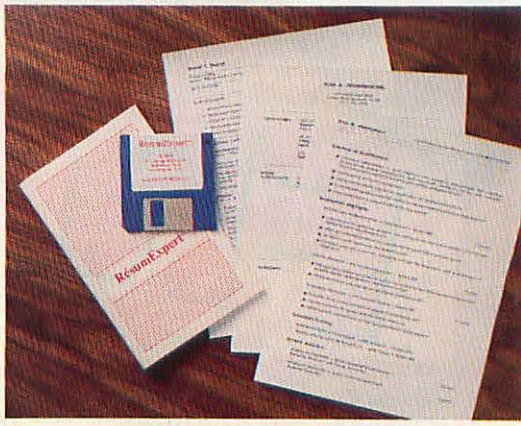

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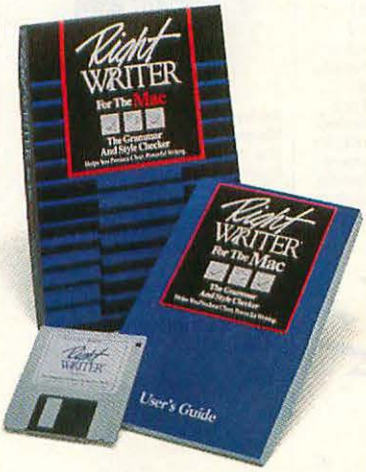

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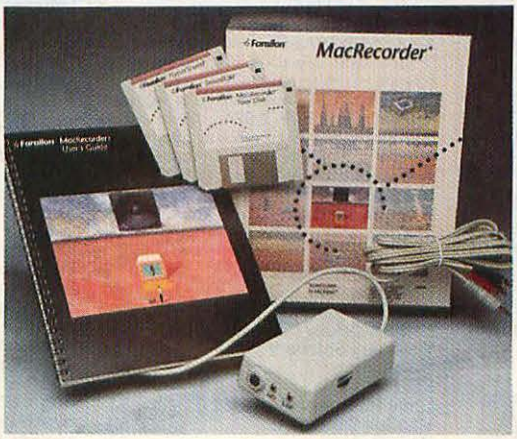

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BlackJack Strategy Tester ..... 65.
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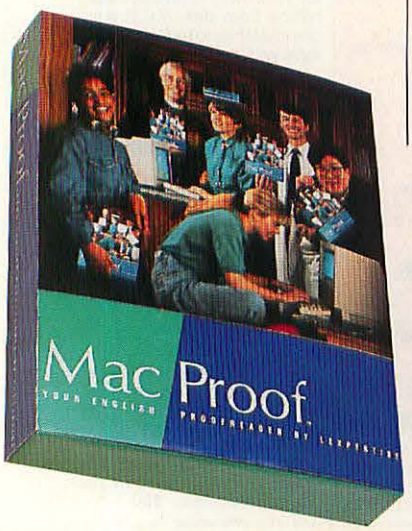

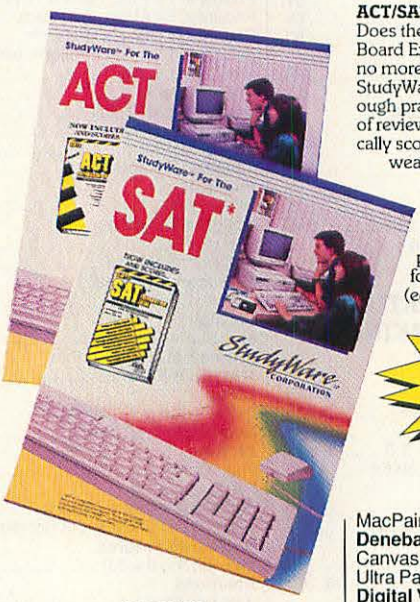

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Menu Fonts 3.0 ..... 28.

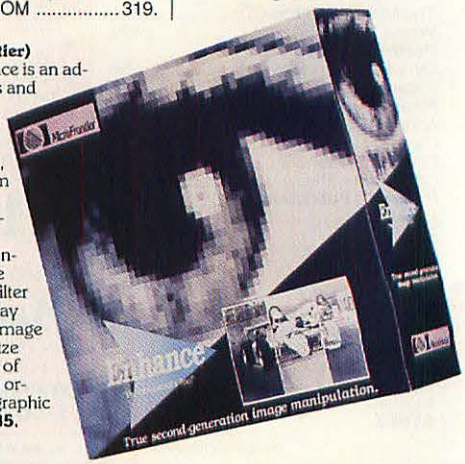
MacProof 3.2.1 (Lexpertise)
You'll never get a second chance to make a first impression! MacProof 3.2.1 is your English proofreader. Without leaving your document, it proofreads all text written on your word processor: business, educational, personal and professional. MacProof is a desk accessory for the Macintosh Plus, SE, II, IIcx. Checks: mechanics, word usage, writing style and structure. You can customize the usage and the spelling dictionaries to your specific requirements. Compatible with MacWrite II V. 1.0, MacWrite V. 4.6 & 5.0, Microsoft Word 4.0, PageMaker 3.0/3.01/3.02, w/ 2mg memory, MindWrite V.1 and V.2. (spelling) **$115.**

Letraset
LetraStudio ..... 275.
LetraFonts (various) ..... ea. 69.
Tactic Software
ArtFonts ..... 50.

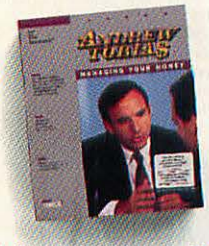
GRAPHICS & DESIGN

3G Graphics
Graphics & Symbols 1 ..... 50.
Business 1 or Accents & Brdrs 1 .. ea.65.
Adobe
Illustrator 3.0 w/ATM 2.0 ..... 349.
Illustrator 88 1.9.3 ..... 275.
Photoshop ..... 499.
Smart Art I, II, III, or IV ..... ea. 89.
Streamline ..... 225.
Aldus
Freehand 2.0 ..... 329.
Aperture Technology
Aperture Visual Information Mgr. ..... 599.
Bright Star Technology
HyperAnimator 1.5.1 ..... 98.
interFACE ..... 249.
Broderbund
TypeStyler 1.5 ..... 119.
Claris
MacDraw II ..... 289.
MacPaint 2.0 ..... 92.
Deneba
Canvas 2.1 189.
Ultra Paint ..... 125.
Digital Vision
Computer Eyes B&W ..... 199.
Computer Eyes Pro Color ..... 349.
Dream Maker
Cliptures, Vol. 1, 2, 3 ..... ea.69.
MacGallery ..... 27.
Electronic Arts
Studio/1 ..... 96.
Studio/8 ..... 295.
Studio/32 ..... 449.
Farallon™
MediaTracks™ ..... 189.
MediaTracks™ Multimedia pack ..... 319.
MediaTracks™ CD ROM ..... 319.

Enhance (Micro Frontier)
Picture perfect. Enhance is an advanced image analysis and enhancement package for the Mac II family. It offers true 256 gray level support, an advanced histogram feature and is the first program to offer an assortment of masking buffers and real time on-screen filters. Enhance allows users to paint, filter and precisely adjust gray scales within isolated image parts. Use it to scrutinize and work with images of everything from micro organisms to entire geographic areas. (graphics). **$235.**



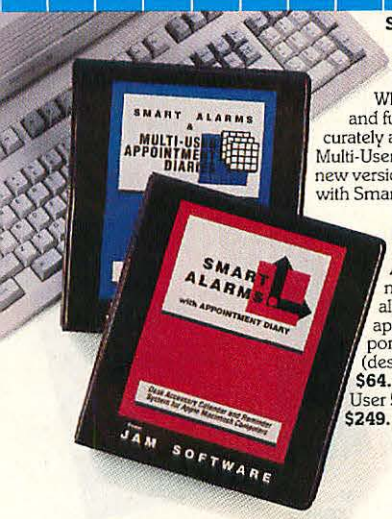
CoStar LabelWriter
The palm-sized labelWriter puts anything you can create with your Mac onto a 1" x 3-1/2" thermal label (130 per roll). Its exclusive print driver software lets you print directly from your database, word processor or any application. In vertical or horizontal format. **$185.**



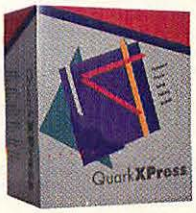
Andrew Tobias' Managing Your Money
The most innovative personal finance package for the Mac. Its six main divisions remind you of important dates, manage income and checking, manipulate tax records, evaluate future plans, manage your investment portfolio and calculate net worth. Comes with lots of on-line help and comprehensive manuals. **$145.**

LYNX Turbo Trackball
The LYNX Turbo Trackball uses Honeywell aerospace technology to give precise fingertip control over cursor movement. Just spin the trackball and the cursor flies across the screen, quickly and accurately to where you want it. Great for desktop publishing, CAD/CAM, graphics and arcade games. **$59.**

MacWAREHOUSE™ 1-800-255-6227

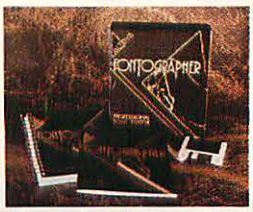


Smart Alarms Muliti-User Appointment Diaries 3.1 (Jam Software)
Who? What? Where? When? Keep track of all past and future appointments more accurately and thoroughly with updated Multi-User Appointment Diaries. The new version is more closely integrated with Smart Alarms 3.0 enabling you to set multiple reminders and times directly from the diary and more. Works on Tops, AppleShare or PSN. Includes new Diary Migration Utility to allow importing/exporting and appending/replacing text. Supports Z88 MacLite™ formats (desk accesories). Single User **$64.** Multi-User 1-4 **$125.** Multi-User 5-8 **$189.** Multi-User 9-15 **$249.** Multi-User 16-25 **$375.**



Quark XPress 3.0
New measurement and page palettes provide interactive on-screen access. A library stores frequently used items and a pasteboard provides a work area next to each page. Rotate text and graphics in 0.001 degree increments up to 360 degrees. Color trapping ensures precise color printing. **$529.**

SupraModem
SupraModem offers complete suppport of the Hayes "AT" command set, auto answer/originate, pass-through phone jack, programmable-volume speaker and stores frequently used numbers in non-volatile memory. Manufacturer provides one year warranty. **$119.**



Fontographer 3.1
Fontographer 3.1 reads and writes Type 1 PostScript fonts! Create & edit downloadable PostScript fonts containing standard alphanumeric and foreign characters, pictograms, icons, and logos to suit your purposes (headlines, advertising and logos). The auto-trace function to saves time when working with scanned characters and images. **$249.**

Innovative Data Design
Dreams 1.1 ..... 319.
Letraset
ColorStudio 645
MacroMind
MacroMind Director 2.0 ..... 439.
Media Maker ..... Call

Computerized Classic Accounting (Absolute Solutions)
The only accounting package that does accounting in the form and organization of manual books. Anyone who knows traditional manual accounting will feel at home with CCA. It allows for extremely fast data entry, prints checks, invoices, W-2's, etc., and generates reports. Since all CCA's documents may also be opened using Excel, you can customize, analyze and create forecasts and graphs using actual data that CCA summarized, formatted and organized during the accounting process. Requires Excel. (accounting). **$225.**

Metro ImageBase (Full Line Available)
Art Deco or People ..... ea. 85.
Newsletter Maker or Business ..... ea. 85.
Micro Frontier
Enhance 235
Multi Ad Services
Multi-Ad Creator ..... 865.
Paracomp
DrawTools ..... 62.
Film Maker ..... 449.
ModelShop 1.1 ..... 375.
Swivel 3D Professional 1.0 ..... 459.
Swivel ART ..... 87.
Silicon Beach
Digital Darkroom 2.0 ..... 248.
Super 3D 2.1 ..... 339.
SuperPaint 2.0 ..... 135.
SoftStream
Relational Objex ..... 149.
Somak
LaserArt CD-ROM #1 or #2 ..... ea. 59.
Sharpen Up ..... 59.
Strata
StrataVISION 3d ..... 375.
Strategic Mapping, Inc.
Atlas Map Maker 4.5 ..... 375.
Studiotronics
Colorset 1.5 ..... 229.
SuperMac
PixelPaint 2.0 ..... 225.
PixelPaint Professional ..... 389.

Tactic Software
Art Clips Vol. 1 or Vol. 2 ..... Call
T/Maker
Click Art Business Images ..... 32.
EPS Illustrations ..... 85.
Business Cartoons ..... 33.
Zedcor
DeskPaint 3.0 and DeskDraw ..... 115.

HARDWARE & PERIPHERALS

Aapps
DigiVideo B&W ..... 399.
DigiVideo Color ..... 699.
Co Star
Label Writer ..... 185.
Cutting Edge
19" Two Page Monitor 959
Hewlett Packard
HP DeskWriter ..... 859.
MegaGraphics Display Systems
Rival 2001 System for Mac II ..... 1275.
Rival 3001 System for Mac SE/30 . 1275.
Rival SE System for Mac SE ..... 1275.
Rival Plus System for Mac Plus ..... 1310.
19" Color 2008 Hi-Res/Mac II ..... 4460.
16" Color 2008 Hi-Res/Mac II ..... 3525.
Grayscale 2008/Mac II ..... 2210.
Grayscale 3008/Mac SE/30 ..... 2399.
Microtek
Microtek MSF-300GS Scanner ..... 1589.
Microtek MSF-300ZS Scanner ..... 1998.
NEC
Intersect CDR-35 ..... 419.
Qume
Crystal Print Publisher ..... 2900.

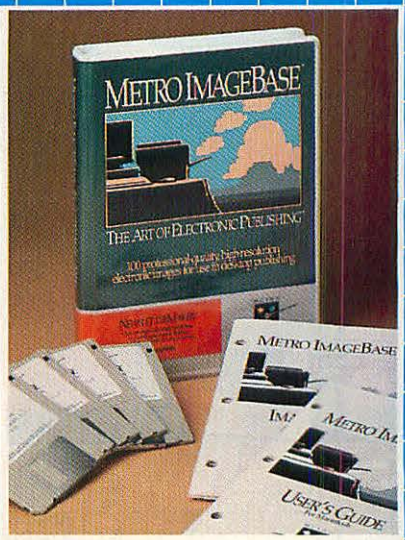
Seikosha America
Seikosha Printer (dot-matrix) ..... 235.
Sharp (full line available)
The Wizard - 32K ..... 229.
ThunderWare
LightningScan 400 ..... 385.
ThunderScan Plus ..... 199.

HYPERWARE

Bantam
Complete HyperCard Handbook ..... 22.
Beacon Technologies
HyperBible International Version ..... 175.
HyperBible King James Version ..... 145.
DataDesk International
HyperDialer ..... 32.
MicroMaps
HyperAtlas ..... 59.
Silicon Beach
SuperCard 1.5 ..... 189.
Softstream International
HyperHit 2.2 ..... 125.
Symmetry
HyperDA 1.2 ..... 45.

INPUT/OUTPUT

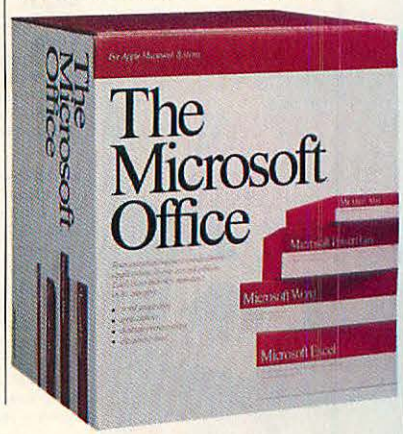
Basic Needs
Cordless Mouse ..... 99.
Caere
Typist ..... 499.
Calcomp
WIZ Tablet ..... 159.
WIZ Pen ..... 57.
WIZ Templates ..... 19.



Metro ImageBase Electronic Clip Art (Metro ImageBase)
Liven up your documents with professional-quality electronic clip art from Metro ImageBase! Classy and up-to-date, they make your newsletters, presentations, reports and brochures communicate more effectively. Each of Metro's 14 packages is topic-related and contains 100 images-each drawn at 300 dpi for maximum resolution. Packages available include: ReportMaker, Business Graphics, Computer & Technology, NewsletterMaker and 10 more. (graphics). **$85.**

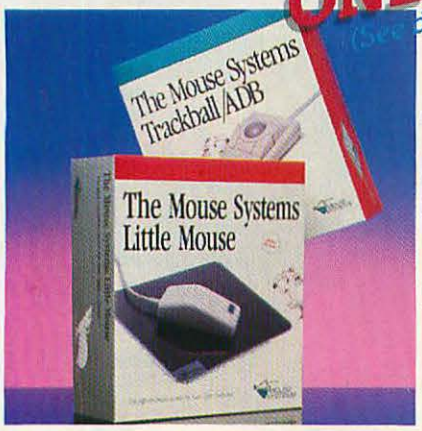
CH Products
Mach IV Plus Mouse/Joystick ..... 51.
Mirage Adaptor ..... 35.
Roller Mouse ADB ..... 75.
DataDesk Intl.
DataDesk Switchboard ..... 175.
Mac 101 Keyboards ..... 129.
Forte Communications
Remote Keyboard/Mouse ..... 289.
Kensington
New Turbo Mouse ..... 109.
Keytronic
MacPro Keyboard ..... 118.
Kraft
ADB Joystick Premium III (SE&II) ..... 49.

The Microsoft Office (Microsoft)
The Microsoft Office provides everything you'll need to increase productivity through word processing (Microsoft Word), spreadsheets (Microsoft Excel), desktop presentations (Microsoft Power Point), and electronic mail (Microsoft Mail). And it all comes in one compact package! Each program is a top-selling stand alone product. But why settle for only a piece of the pie? You'll want to use all of these productivity tools together for a complete business solution. (business) **$525.** Also available on CD-ROM **$669.**



GUARANTEE

Many of our products come with a thirty day money back guarantee, if you are not completely satisfied. Ask for details when you place your order.



Trackball ADB (Mouse Systems)
Mouse functionality in a fraction of the space. Ergonomically designed for hours of comfort while providing smooth, accurate, cursor positioning. **$69.**

Little Mouse
Little Mouse combines advanced optical technology with the latest CMOS analog/digital chip design to produce the smallest, lightest, most accurate mouse possible. (input) **$75.**

QuickStick ..... 39.
Trackball ..... 79.
Koala
MacVision 3.0 269
LYNX
LYNX Turbo Trackball ..... 59.
MicroSpeed
MacTrac ADB ..... NEW 75.
MacTrac DB9 ..... 62.
Micro Touch
The UnMouse ..... 189.
Mouse Systems
TrackBall ADB ..... 69.
Little Mouse ..... 75.
Pacific Data Products
MacPage ..... 425.
MacPage PE ..... 459.
Practical Solutions
Mouse Master ..... 39.
Summagraphics
Bit Pad Plus ..... 319.

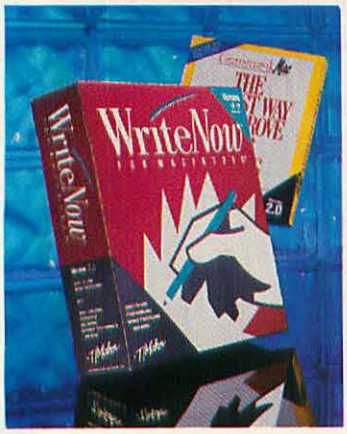
LANGUAGES

Digitalk, Inc.
Smalltalk/V MAC ..... 125.
Shana Corporation
Inside Out ..... 369.
Symantec
THINK'S C 4.0 or Pascal ..... ea. 165.
Zedcor
ZBasic 5.0 ..... 99.

MEMORY UPGRADES/ ACCELERATORS

1 MEG SIMMS
Low Profile, 120ns High Quality
Single In-Line Memory Modules
..... **Low price $69.**
For MacPortable ..... 435.
For IIfx - 80ns ..... 119.
For LaserWriter II NTX - 80ns ..... 119.

Dove (full line available)
MaraThon 030 Accelerators ..... 529.
MacSnap 524E ..... 185.
MacSnap 524S ..... 239.
MacSnap 548S ..... 499.



MODEMS/FAX

Abaton
InterFax12/48 ..... 265.
InterFax 24/96 ..... 419.
Best Data Products
SmartOne 2400/1200 ..... 139.
Dove
DoveFax desktop ..... 299.
Hayes
Smartmodem 2400 ..... 349.
Smartmodem 9600 (V series) ..... 759.

SmartOne 2400 Modem (Best Data Products)
When you need a 2400 baud modem, the SmartOne 2400/1200 provides an economical alternative. For less than the cost of some 1200 bps units, you get a Hayes compatible modem with auto answer/originate, 300, 1200 and 2400 baud operation, pass-through phone jack, speaker with programmable volume, and a manufacturer's two-year warranty. All user options are stored in non-volatile memory. Includes free Quicklink II communications software, modem, cable and **CompuServe/Prodigy Start-Up Kit** offer. (modems) **$139.**

Power User™
2400 baud modem ..... 99.
24/96 Mini Send Fax ..... 149.
Prometheus
MaxFax ..... 309.
2400 Mini Fax ..... 209.
ProModem 2400 SE Int. ..... 209.
ProModem 2400M ..... 199.
ProModem 2400M II ..... 205.
Travel Modem ..... 205.
Supra
Supra Modem 2400 ..... 119.

MUSIC AND SOUND

Altech
MIDI Interface ..... 59.
Coda
MacDrums ..... 31.
Perceive ..... 49.
Electronic Arts
Deluxe Music Construction 2.5 ..... 85.
Deluxe Recorder ..... 99.

WriteNow 2.2 (T/Maker)
WriteNow now comes with Grammatik 2.0, a top grammar/style checker($99.00 value-FREE). The two-time winner of the prestigious MacUser Eddy award, WriteNow features a 1.4 million word thesaurus, 135,000 word dictionary (the largest thesaurus/dictionary combination in the Macintosh world) and compatibility with Microsoft Word. In addition to being one of the most affordable, fastest and easiest Mac word processors available, WriteNow can still run on a floppy disk system. (word processing). **$119.**

Farallon Computing
MacRecorder 2.0 (records sound) ... 159.
MacRecorder Voice Digitizer ..... 99.
MacRecorder Voice Digitizer-10-pak Call
Passport Designs
NoteWriter II 2.3 ..... 325.
Passport MIDI Interface ..... 89.
Primera Software
Different Drummer ..... 59.
Repertoire
Music Publisher ..... 359.
Resonate
Listen 2.0 ..... 62.
Tactic Software
Sound Clips Vol. 1 ,2,3,or 4 ..... ea. 49.

SECURITY & VIRUS PROTECTION

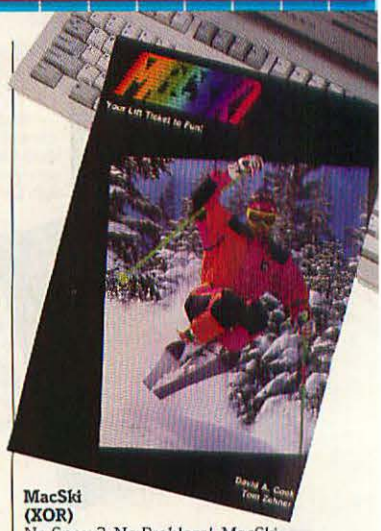
ASD Software, Inc.
FileGuard 2.5 ..... 145.
FileGuard Office 5-pack ..... 435.
FileGuard Office 10-pack ..... 685.
Fifth Generation
Disk Lock ..... 118.
Microcom
Virex ..... 59.
Virex 10-pack ..... 349.
Kent Marsh
MacSafe II ..... 107.
NightWatch ..... 86.
QuickLock ..... 34.

SPELLING/DICTIONARY THESAURUS CHECKERS

Mainstay
AntiToxin ..... 59.
Symantec Corporation
S. A. M. ..... 67.

Deneba Software
BigThesaurus ..... 64.
Spelling Coach Pro 3.1 ..... 124.
Electronic Arts
Thunder II ..... 49.
Lexpertise
MacProof 3.2.1 ..... 115.

QuicKeys 2™ (CE Software)
New, more intuitive QuicKeys 2 lets you customize applications to make them work the way you want, build new applications from old ones and automate repetitive tasks. Put your entire extended keyboard to work by assigning anything you select or click to its keys. Automate a long task with one of the two new "watch me" modes. Any QuicKey can be activated using timer options that will repeat the task every minute, hour, day or week. (utilities). **$64.**



MacSki (XOR)
No Snow? No Problem! MacSki brings the slopes to you! The only thing you'll need is a little daring while swooshing through these runs in digitized sound and full color. Select any of up to 20 breathtaking layouts or design your own dream course using MacSki's built-in Course Editor. Create up to 256 different course combinations based on difficulty level, snow condition, visibility and wind speed. Meet you at the top! (entertainment). **$39.**

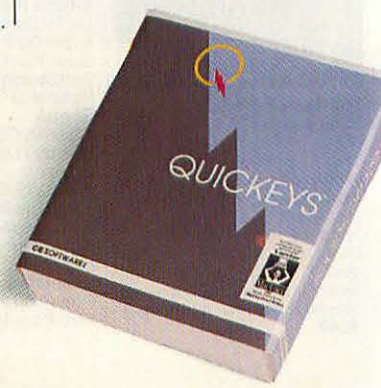
LifeTree
Correct Grammar ..... 49.
Microlytics
Word Finder 2.0 ..... 34.
Sensible Software
BookEnds or Sensible Grammar ..... 51.

STATISTICAL ANALYSIS

Abacus Concepts
StatView II ..... 279.
StatView SE+Graphics ..... 179.
SuperANOVA ..... 309.
Wolfram Research
Mathematica (SE) ..... 450.

UTILITIES

Abbott Systems
CanOpener 1.1 ..... 64.
Chesire 1.0 ..... 63.
Aladdin Systems Inc.
Programmer's Assistants ..... 57.
Shortcut ..... 46.
StuffIt Deluxe ..... 63.
ALSoft
DiskExpress II 2.04 ..... 57.
MultiDisk ..... 49.
Master Juggler ..... 64.
American Power Conversion
Power Chute ..... 69.
Berkeley System
After Dark ..... 24.



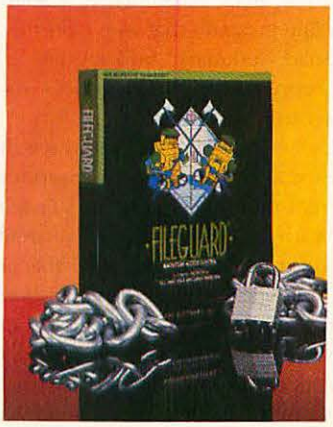
CompuServe™

You can now contact MacWAREHOUSE or place orders with us in e **Electronic Mall** on CompuServe. The **MacWAREHOUSE GO code GO MW**. As always, you'll get fast, dependable overnight service and you can leave messages for Kerry or any of our support staff.

MacPro Keyboard (Keytronic)
The Mac Pro keyboard feels better, lasts longer and offers more features for your money. Keytronic's new ADB-compatible 105-key MacPro features an enlarged L-shaped Return key for faster, more accurate data entry. Dual-legend keycaps assure ease of operation in both Macintosh and MS-DOS environments. Includes a FREE copy of award winning macro package Tempo II. Backed by a three year manufacturer warranty. (input) **$118.**

CE Software
Alarming Events ..... 85.
QuicKeys 2.0 ..... 64.
Caere
OmniPage 2.1 ..... 539.
Central Point Software
Copy II Mac ..... 23.
Mac Tools Deluxe ..... 75.
Custom Applications
Freedom of Press 3.0 ..... 255.
Dantz Development
Retrospect ..... 148.

Now Software
Now Utilities ..... 89.
Screen Locker ..... 45.
OLDUVAI
ClipShare ..... 165.
MultiClip 2.0 ..... 69.
ON Technology
On Location ..... 75.
QMS
UltraScript ..... 119.
UltraScript Plus ..... 299.
Software Innovations
HandOff II ..... 52.
SuperMac
DiskFit 1.5 ..... 58.
Symantec Corporation
Norton Utilities for the Mac ..... 84.
SUM II ..... 99.



FileGuard (ASD Software)
"FileGuard stands out, especially for corporate users." MacUser May, 1990 Issue Protect your Hard drives and Partitions from unauthorized access (including security bypass with a system diskette), copying, and erasure; Applications and Files/Folders (including system folder) from unauthorized access, deletion, and/or illegal copying; Desktop (including system folder) from alterations by unauthorized users; Keep an eye on System Usage with the system users log which continuously tracks user/group activity. (security) **$145.** Office 5 Pack **$435.** Office 10 Pack **$685.**

Tactic Software
FontShare 2.0 ..... 149.
Icon-It 2.0 ..... 45.

Dayna Communications
DOS Mounter ..... 55.
Fifth Generation
FastBack II ..... 118.
Suitcase II 1.2 ..... 49.
SuperLaserSpool 2.0 (single user) .... 87.
SuperSpool 5.0 ..... 58.
ICOM Simulations
On Cue ..... 35.
Insight Development
MacPrint ..... 95.
Magic Software
AutoSave II ..... 28.
BackMatic ..... 50.
Mainstay
Capture 3.0 ..... 49.
MacFlow 3.5 ..... 125.

WORD PROCESSORS & OUTLINERS

Claris
MacWrite II ..... 145.
Microsoft
Word 4.0 ..... 245.
RightSoft
RightWriter for the Mac ..... 55.
Tactic
Clairvoyant ..... 49.
T/Maker
WriteNow 2.2 ..... 119.
WordPerfect Corp.
WordPerfect ..... Call

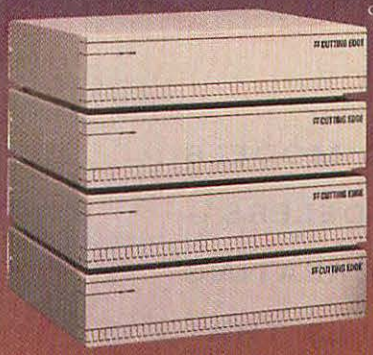
Planisoft (ASD Software)
Planisoft increases workplace productivity through detailed management of time and resources. Use its intuitive user interface and powerful relational database to simultaneously manage and record activity concerning hundreds of people, events, materials and locations. Juggle multiple work group agendas and instantly recall your contacts and related data for a given period of time. Also tracks time spent on a particular account by individual employees. Everything is kept confidential through multi-level password protection. (business). **$139.** Office 5 pack **$575.** Office 10 pack **$839.**

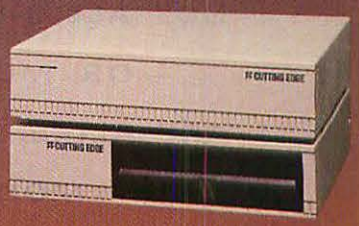
Circle 78 on reader service card

STOP PRESS

Cutting Edge Hard Disk Drives (Cutting Edge)
New enhanced Cutting Edge drives deliver quiet, reliable memory with access times as low as 20ns. New features include two power outlets, 50-pin cables for easier daisy chaining, a quieter fan, dual-fuse surge buffer and simplified operation manuals. Available in 20MB to 80MB sizes. **20MB Only $309., 30+MB Only $379., 45+MB Only $435, 60+MB Only $469., 80+MB Only $529.**

The enhanced 45MB Removable is based on the same award winning SyQuest mechanism that other leading makers offer at twice the price. Exchangable cartridges provide unlimited storage. (drives) **45MB Removable: $679.**





Power User™ 2400 baud Modem
Install a new Power User 2400 baud modem and log-on to CompuServe™ or any of the exciting on-line services! This new, full-featured modem comes complete with everything you need to start communicating. It's easy to install and ready to use - all cables and MacKNOWLEDGE communication software are included. It also has all the features you need in a modem, including Auto Answer, Auto Dial and Advanced Diagnostics for error checking. **Only $99.**

Power User™ 24/96 Mini Send Fax
New! Send Important documents to destination fax machines with the Mini Send Fax. Mini Send Fax combines the technologies of the Power User 2400 bps data modem and an internationally compatible 9600 bps, Group III fax. **Just $149.**

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FAX: 908-905-9279
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24 HOURS A DAY.
NEW! Express Customer Service Number: 1-800-445-9677

Introduction to
MODELI

NOT ALL 3-D MODELS —OR MODELERS— ARE ALIKE. CREATING MODELS THAT DO WHAT YOU NEED THEM TO REQUIRES THAT YOU FIRST PICK THE RIGHT TYPE OF MODELING PACKAGE.

by Doug Houseman and Anna O'Connell

Three-dimensional modeling is used on the Macintosh these days to do everything from simulating chemical experiments or analyzing the performance of an automobile part to walking through architectural models and generating frames for animation. Most 3-D projects require specialized programs like finite-element or rendering packages. All, however, begin with a modeling package, or in the modeling portion of a package that includes other capabilities.

Although modeling is typically only one step in a long process toward creating a machined part, rendered walkthrough, or stress test, it's an important step. If you don't construct the model correctly to begin with, it won't perform correctly when it must fulfill its purpose. So, before you buy a modeling package, take careful stock of the characteristics necessary for your purposes. For example, a model to be used by a team of engineers for structural analysis may require that all of the nuts and bolts be individually represented as points or surfaces at which forces act. This type of model calls for a program that offers extensive 3-D library support for symbols and allows the import of CAD files from elsewhere. Structural-analysis also demands a great deal of computer power, memory, hard disk space, and creation time. In contrast, cartoon storyboarding requires rapid model creation, relatively high-level representation of detail, but little or no internal-part representation.

A modeling program generally does only one thing well. A package that allows you to pull a third dimension from a 2-D picture probably won't support the data structures needed for structural analysis. Similarly, a solid-modeling program that uses Constructive Solid Geometry (building blocks) may represent curved surfaces too crudely to use for illustration.

Use of Macintoshes for three-dimensional modeling has exploded in recent months. More than 30 packages with 3-D capabilities were available commercially at the time this article was written, and at least a dozen more graphics and CAD programs are expected to be released or upgraded to include 3-D capabilities in the near future. With its WYSIWYG interface and high-resolution screens, the Macintosh is overtaking Silicon Graphics' workstations as the low-end platform of choice for modeling three-dimensional objects.

Types of Models

There are four basic types of 3-D models: wire-frame, polygonal-surface, solid, and parametric.

Wire-frame models represent objects as collections of geometric entities. You can use either 2-D entities, such as points and lines, or 3-D entities to define a wire frame. Currently, wire-frame modeling programs will permit use of some, but not all, curved entities; that is, most modelers permit use of circles or arcs, but not free-form curves. Other curved surfaces are

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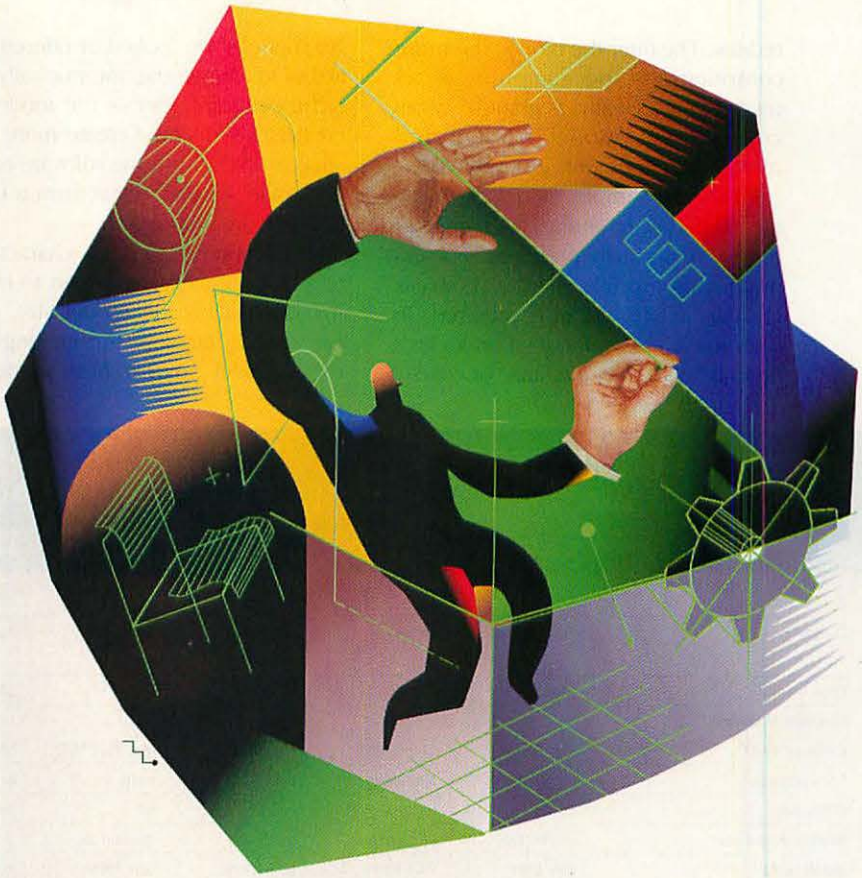

MICK WIGGINS

shown by a series of line segments. You can make these line segments arbitrarily short to provide the illusion of curvature. Wire-frame models may also carry additional information—material properties, for example—attached to the geometry that makes up the on-screen portion of the model. Numerical-analysis programs, such as finite-element analysis software, often use wire-frame models as the basis for calculation. Or a designer could use a wire frame as the skeleton on which to build a surface model.

As the name implies, polygonal-surface models are made up of a collection of polygons. You can make a polygon arbitrarily small to allow the model to appear curved. For curved surfaces, the polygon used is typically a triangle. The smaller the polygons, the smoother the surface appears, and the larger the data file containing the model is. Display update also takes noticeably longer as the size of the model increases. Designers use polygonal models when the surface of the object is of primary interest. Examples include architectural walkthroughs, illustrations, and animation. Solid models of the building-block type are created from collections of three-dimensional geometric entities such as cylinders, cubes, and cones. This technique is called Constructive Solid Geometry, or CSG. This type of model offers the ability to show slices, or cutaway views, of the interior of the model. Depending on the additional data attached to the model, a solid model may be used for either analysis or viewing. (See "Beneath the Surface: The World of Solid Modeling," *Macworld,* March 1990.)

Mathematically defined, or parametric, models are more complex and computation-intensive than the other types. Parametric models use points and equations to represent each surface, solid, or motion within a model. Because the equations must either be known or derived at the time the model is constructed, parametric models are the most difficult and time-consuming to construct. They also provide the most realistic type of display available on personal computers, and can be used for the most detailed types of analysis. MicroStation Mac from InterGraph Corporation and MacBravo Modeler from Schlumberger have the best parametric model-creation capabilities (for more information about MacBravo, see *Reviews,* this issue). An exception to our earlier generalization about programs generally being able to do only one thing well, MacBravo Modeler is also one of the best solid modelers.

Model Characteristics

Models, and the software used to generate them, have two additional characteristics that are important to consider when you are selecting a modeling package. The first is the granularity of the models created; the second is the limit on the model size allowed by the modeling package.

Granularity describes the density of the geometric entities used to represent a feature of a model, such as the facets covering a surface. Granularity is important in three ways. First, it determines how smooth the final model appears—the finer the grain, the smaller an area each facet covers, and the smoother the final image is. Fine granularity is required to represent complex curves or highly detailed surfaces. Second, a model's granularity determines how long it takes to

redraw. The finer the model, the more computations the computer is required to do. Finally, as granularity becomes finer, model storage and memory requirements go up quickly.

For very simple models, a modeler with fewer entities and quicker redraw is normally preferred. For engineering models used for stress analysis, a fine model is required. In this article, we refer to a modeler's granularity as fine, medium, or coarse. No modeler we looked at offered the ability to change the automatically determined granularity of the models it created. Users could create more and smaller objects, but the software could not create smaller facets from a user-defined menu choice.

The second modeler characteristic you want to pay attention to is the maximum-allowable model size. Size can quickly become the limiting factor in model creation. Most modeling packages require that the whole model be in memory. This way, changes are processed fast enough that the user perceives the software as responding interactively. A few modeling packages load only the active portions of a model. This enables you to cheat memory limits by working with only a few objects at a time.

Most of the products we evaluated have a maximum of about 300,000 points per model. A point, being the

MODELERS COMPARED

	ArchiCAD	Architrion II	Ashlar-Vellum 3D	Aura-Modeler	Auto/CAD	Compugraph	Design CAD 2D/3D	DynaPerspective
Version number	3.4.2	Series 5.5	1	2.5	IIe	1	2.1	1.1
Company	Graphisoft USA	Gimeor	Ashlar	Aura CAD/CAM	Autodesk	Klex Software	DesignCAD	Dynaware
Price	$3950	$5500	$995	$695	$3500	$40	$699	$995
Minimum Macintosh/minimum RAM	Mac II/2MB	Mac II/4MB	Mac II/4MB	Mac Plus/1MB	Mac II/4MB	Mac Plus/1MB	Mac Plus/1MB	Mac II/2MB
Copy protection	hardware	hardware	none	none	none	none	none	none
Online help	no	minimal	no	no	yes	no	no	yes
Recommended use	architecture	architecture	mechanical	mechanical	mechanical	illustration	mechanical	illustration
Model types	wire frame, solid, polygonal	wire frame, solid	wire frame, solid	wire frame, polygonal	wire frame, polygonal	wire frame	wire frame, parametric, solid	polygonal
Input style	object	object	object	object	object	object	object	object
Model size	medium	medium	small	large	small	small	large	medium
Lathe/extrude	no/yes	no/no	no/no	no/no	no/no	no/no	no/yes	no/yes
Slice control	no	no	no	no	yes	no	no	no
Multilevel undo	no	no	no	no	no undo	yes	no	no
Hidden line/surface removal	yes/yes	yes/yes	yes/yes	yes/yes	yes/yes	no/no	yes/yes	yes/yes
Fly-through and walk-through	no	no	no	no	no	yes	yes	yes
Symbol library	yes	yes	partial	yes	partial	no	yes	yes
Input/Output Formats								
DXF/IGES	yes/no	yes/no	yes/no	yes/yes	yes/import	no/no	yes/yes	yes/no
RIB/PICS	no/no	no/no	no/no	no/no	no/no	no/no	no/no	no/yes
PICT/PostScript	yes/no	yes/no	yes/no	yes/no	no/no	yes/no	yes/yes	yes/no
Plot files	yes	no	no	yes	yes	no	yes	no
Accuracy (significant digits)	16	16	16	16	16	8	16	8
Duplication								
3-D linear	no	yes	yes	yes	yes	yes	yes	yes
3-D cubic	no	no	no	yes	no	no	no	yes
3-D spherical	no	no	no	no	no	no	no	no
Number of linked projects	0	0	0	0	0	0	0	0
Number of layers	256	256	8	∞	250	1	256	16
Deform	no	no	no	no	no	partial	yes	no
Real-world scales	yes	yes	yes	yes	yes	partial	yes	yes
Output to finite elements	yes	no	no	yes	yes	no	yes	no
Stress models	no	no	no	yes	no	no	yes	no
Strain models	no	no	no	yes	no	no	yes	no
Animation suitability	poor	adequate	poor	poor	none	adequate	poor	good
Rendering abilities	adequate	poor	poor	adequate	none	none	good	good
Analysis support	good	adequate	adequate	good	adequate	none	good	none

** Prerelease; specifications subject to change.*

simplest geometric entity, requires the least amount of data to define it. With a coarse modeler like Swivel 3D, the 300,000-point limit allows about 1000 spherical objects within a model. This sounds like plenty until you discover that a single blade in a jet engine requires twice that number of facets to be adequately defined for fluid-flow calculations. Since over 200 blades are required for a single stage, only 2 stages of a 12-stage jet engine can be modeled at one time with the majority of wire-frame or surface packages that are available on the Mac.

In "Modelers Compared," we've rated modelers as handling small (less than 150,000 points), medium (150,000 to 300,000 points), and large (more than 300,000 points) models. MacBravo Facilities offers the largest number of vertices of any of the modelers we tried. Virtus WalkThrough offers one of the smallest number of available vertices. But WalkThrough is a solid modeler, and solids are defined using about the same number of points as each polygon requires in a surface modeler. Therefore, it can build larger models than most of the surface modelers.

Building the Model

There are two common methods of entering data to construct a model. The first way is to define the model in

Facilities Manager	In-CAD	MacBravo Detailer and Modeler	MacConcept	MacSAP III	MacSURF	MicroStation Mac	MiniCAD+	ModelShop	PEGASYS II	Presenter Professional
1	1.1.1	2	3	3	4.5	3.5	3	1.1	3.2.3	1
Schlumberger	Infinite Graphics	Schlumberger	Klex Software	Softing	Graphic Magic	Intergraph Corporation	Graphsoft	Paracomp	IGC Technology	VIDI
$3995	$2495	$3400	$1995	$2600	$4500	$3300	$795	$595	$1795	$2199
Mac II/8MB	Mac II/2.5MB	Mac II/8MB	Mac Plus/2MB	Mac Plus/1MB	Mac Plus/1MB	Mac II/4MB	Mac SE/1MB	Mac SE/1MB	Mac II/1MB	Mac II/4MB
none	none	none	none	none	none	hardware	none	none	none	none
yes	yes	yes	no	no	no	partial	extensive	no	no	yes
architecture	mechanical	mechanical	illustration	mechanical	mechanical	mechanical	mechanical	illustration	mechanical	illustration
wire frame, parametric	wire frame, polygonal	wire frame, parametric, solid	wire frame	wire frame	wire frame, polygonal	wire frame, parametric	wire frame, polygonal	wire frame, solid	wire frame, polygonal	wire frame, parametric
object	object	object	object	vertex	object	object	object	object	object	object
large	small	medium	small	small	medium	medium	medium	medium	small	large
no/yes	no/no	no/yes	no/no	no/no	no/no	no/no	no/yes	yes/yes	no/yes	yes/yes
yes	no	yes	no	no	no	no	yes	no	no	no
yes	no	yes	yes	no	no	no	yes	no	no	no
yes/yes	yes/yes	yes/yes	yes/yes	yes/no	yes/yes	yes/yes	yes/yes	yes/yes	yes/yes	yes/yes
no	no	no	yes	no	no	no	no	no	no	yes
yes	partial	yes	no	no	no	yes	yes	yes	partial	yes
yes/yes	import/import	yes/no	no/no	no/no	yes/yes	yes/no	yes/no	no/no	no/no	yes/import
no/no	no/no	no/no	no/no	no/no	no/no	no/no	no/no	no/no	no/no	import/import
yes/no	export/no	yes/no	yes/no	no/no	yes/no	yes/export	yes/yes	yes/no	export/yes	yes/yes
yes	yes	yes	no	no	yes	yes	yes	no	yes	no
16	4	16	8	16	16	16	12	8	4	variable
yes	no	yes	yes	no	no	yes	yes	yes	yes	yes
yes	no	yes	no	no	no	yes	yes	yes	no	yes
yes	no	yes	no	no	no	yes	yes	no	no	no
16	0	0	0	0	0	0	0	0	0	0
256	8	356	1	1	1	1500	∞	235	180	0
no	no	no	partial	yes	yes	no	no	yes	no	yes
yes	yes	yes	partial	yes	yes	yes	yes	yes	yes	poor
yes	no	yes	no	yes	yes	no	no	no	no	none
yes	no	yes	no	yes	yes	no	no	no	no	none
yes	no	yes	no	yes	yes	no	no	no	no	none
adequate	none	adequate	adequate	none	none	adequate	poor	good	poor	good
none	none	none	none	none	adequate	none	none	good	none	good
good	none	good	adequate	good	good	adequate	adequate	poor	none	poor

terms of objects. You can use squares, circles, cubes, balls, or other 2-D and 3-D shapes to create a series of objects on the computer screen. Once the 2-D shapes have been lathed or extruded to give them a third dimension, the 3-D objects are grouped, deformed, and smoothed to create the final entity required, almost like creating shapes from blocks of clay. Swivel 3D Professional is one of the best examples of a program using this type of data entry.

Using the second method, you define end points or vertices and the lines between the vertices to create a wire frame. The process is much like building with Tinkertoys. You can then use the wire-frame model as is, or you can selectively deform it, or you can make it the skeleton of a surface model. Surfaces are most often made up of multiple polygons. StrataVision 3d is a good example of this method.

Both vertex- and object-entry methods can create useful surface models, but only the object method can directly create solid models. Either method can be used in a parametric-modeling package to input the purely visual aspects of the model. Parametric models also require an additional step of entering some of the models' parameters. You must type in values for these or load them from a data file. Some types of model parameters you must enter as numerical values. You can indicate others, such as limits to motion, by selecting a portion of the model and dragging it

MODELERS COMPARED (CONTINUED)

	Pro3D/Mac	Strata-Vision 3d	Super 3D	Swivel 3D	Swivel 3D Professional	VersaCAD	Walk-Through*	Zoom
Version number	1.2	1.4	2.1	1.1	1	2.1.2		1.15
Company	Enabling Tech	Strata	Silicon Beach	Paracomp	Paracomp	Versacad	Virtus	Abvent S.A.R.
Price	$349	$495	$495	$295	$695	$1995	$895	$1395
Minimum Macintosh/ minimum RAM	512K/512K	Mac SE/30/IIMB	Mac Plus/1MB	Mac Plus/1MB	Mac II/4MB	Mac SE/1MB	Mac II/4MB	Mac II/4MB
Copy protection	none	none	none	none	none	none	none	none
Online help	no	yes	no	no	no	no	no	no
Recommended use	illustration	illustration	illustration	illustration	illustration	mechanical	illustration	illustration
Model types	solid	wire frame, polygonal, solid	wire frame, polygonal	wire frame, polygonal	wire frame, polygonal, solid	solid	solid	wire frame, solid
Input style	object	vertex, object	object	object	object	object	object	object
Model size	small	medium	medium	small	medium	medium	medium	small
Lathe/extrude	yes/yes	yes/yes	yes/yes	yes/yes	yes/yes	no/yes	yes/yes	yes/yes
Slice control	yes	no	no	no	no	no	yes	yes
Multilevel undo	no	no	no	no	no	no	no	no
Hidden line/surface removal	yes/yes	yes/yes	yes/yes	yes/yes	yes/yes	yes/yes	yes/yes	no/yes
Fly-through and walk-through	no	no	no	no	no	no	yes	no
Symbol library	no	no	no	no	no	yes	no	no
Input/Output Formats								
DXF/IGES	no/no	import/import	no/no	no/no	no/no	yes/yes	import/import	no/no
RIB/PICS	no/no	no/no	no/yes	no/yes	yes/yes	no/no	no/no	no/no
PICT/PostScript	yes/import	yes/export	export/yes	yes/no	yes/no	yes/yes	yes/no	yes/no
Plot files	no	no	no	no	no	yes	no	yes
Accuracy (significant digits)	8	8	8	8	8	16	4	8
Duplication								
3-D linear	yes	yes	yes	yes	yes	yes	yes	yes
3-D cubic	no	no	no	no	no	no	no	yes
3-D spherical	no	no	no	no	no	no	no	no
Number of linked projects	0	0	0	0	0	0	0	0
Number of Layers	1	1	1	1	1	32	1	128
Deform	no	yes	no	yes	yes	no	no	no
Real-world scales	no	no	no	yes	yes	yes	yes	no
Output to finite elements	yes	no	no	no	no	no	no	yes
Stress models	yes	no	no	no	no	no	no	yes
Strain models	no	no	no	no	no	no	no	yes
Animation suitability	none	good	good	adequate	good	poor	good	adequate
Rendering abilities	none	good	good	adequate	good	poor	good	good
Analysis support	none	poor	none	poor	poor	adequate	poor	adequate

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through the acceptable range.

In architectural software, the beginning point is an imported 2-D drawing. Typically, you would extrude a plan view to add the vertical dimension of height. Extrusion usually creates polygonal surface models. Then you modify the model by cutting openings to place windows in a house or screws in a door, for example. Extruded models are not normally useful for analysis, but they do allow walkthroughs.

The tools used to do solid modeling feel distinctly different from those used to work with surface models. Most solid modelers treat the 3-D entities from which models are assembled as a cross between steel and clay. Like metal, solids may be melted, drilled, or cut with a torch. Like clay, they can be carved or stretched. Luckily, solid modeling is cheaper and faster than working with traditional sculpting media—and more forgiving. With stone, if you take a little too much off the nose of a statue, that's it. With solid modeling and multiple-level undo, the sculptor can take back the last 20 or so cuts and try again.

Polygonal surface modeling in all its forms is less dramatic. Unlike the machine-shop atmosphere of solid modelers, with surface modelers you can't chop objects in half or cut holes in them. Instead, you must work with a series of objects or points to build up a shape. This process starts with lines, points, and the lower-level entities. Splines and curves can be added to create very complex objects. The modeler then groups the components and treats them as a single object.

From the objects entered by the user, the modeler normally generates a rough wire frame. This wire frame is covered with a mesh, a series of lines that run between points in the model to define crude surfaces. This rough model is useful for rapid deformation of objects in most packages. Because the model is usually coarse and the number of objects on the screen is low, a user can rapidly reshape the model by pulling or pushing on any point in the mesh with the cursor. This deformation can lead to quick construction of complex objects without having to create the many individual components otherwise required.

Duplication is a useful data-entry tool that can be included in solid or surface modelers. Duplication in 3-D allows a designer to make copies of objects and place them accurately in space. "Modelers Compared" lists three types of duplication. Linear duplication is the ability to re-create one duplicate at a designated point in 3-D space. Cubic duplication is the ability to copy up to eight objects at eight points in space that define the corners of a box surrounding the original object. Spherical duplication copies objects at a known distance or radius from the original at any point on a sphere, like the mirrors on a mirror ball at the disco. These forms of duplication can be used to quickly create complex objects from a single item.

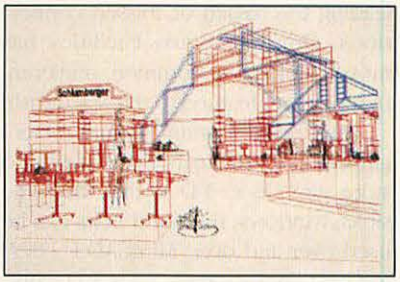
Preparing Output

Models may be rendered, animated, assembled, analyzed for stress or strain, plotted, or used as an input to a numerically controlled milling machine. Each use has a format requirement that the model must accommodate. Models that will not transfer accurately and without significant conversion effort are a waste. Some translation problems can be solved by using Kandu Software's CADmover, but it is simpler to choose a package that supports the format you need.

For most engineering purposes, the formats you need are the 3-D implementations of IGES or Autodesk's DXF. These formats allow more than 90 percent of the information that you have created to move to another package. Stress and strain packages usually require input in IGES. Machine-tools and finite-elements packages may require XYZ files, which define the points that make up surfaces but ignore the rest of the information. Families of programs such as InterGraph Corporation's MicroStation Mac and Schlumberger's MacBravo series have their own internal formats that allow transfer of information between the modeler and the analysis package without data loss.

Using drawings in presentations and reports is a common requirement in many businesses. PICT and PostScript are the most useful formats for this purpose. Plot files (most often HPGL) allow 2-D or 3-D images to be drawn on a plotter or to drive some computer-controlled machine tools.

The drawing environment in Swivel 3D Professional. The Lighting dialog box enables you to set the intensity and direction of eight light sources independently. The Fill Only option controls whether the light sources simply shade the object or cast shadows as well. At bottom is the Material Palette; clicking on any of the material choices calls up a further dialog box that establishes characteristics like the level of reflectivity or transparency.



A wire frame created in Facilities Manager.

Pixar's RIB is scene-description language that's required if you intend to export your model—along with information about lighting, camera position, lens type, and other rendering data—to a RenderMan rendering engine. PICS enables programs like MacroMind Director to open a sequence of animation files; this is much more convenient than opening files one at a time. Both PICS and RIB only come into play if you will also be using your modeler for rendering and scene description, respectively.

For Complex Projects Only

Multiple drawing windows, layers, and linked files or projects enable an engineer or illustrator to create complex, real-world models in a comfortable environment. Multiple layers enable architects to work first on a structure, then on partitions, then on piping, and so forth, without the clutter of other systems in the way. Yet, by turning on all of the layers, the architect can find

interferences between drain and supply water lines, for example, long before the pipe is cut and welded into place. On the Mac, these interferences are found via a walk-through of the completed model. By transporting the model to another platform, you can take advantage of analysis programs that will find interference problems.

Linking enables several related files to be tied together. The related drawings are tied to a master file, but can be worked on separately by a large group of people. Linking eliminates the potential problems of storing different portions of a large project on separate layers in a single drawing. The problem with the layered method is that the wrong layer might be activated while you're designing a new portion, leading to crossed or missed connections. Only MacBravo Facilities has moved linking, a common minicomputer-system feature, to the Macintosh.

Another important feature for engineers and architects is the ability to store symbols in 3-D so that the same sinks, windows, nuts, and bolts can be used over and over. MiniCAD+ offers the best library interface for 3-D work.

Recommendations

There is no one package that will suffice for every user or use. Before you buy, try out two or three packages that appear to apply to your area of interest. The most powerful package will not suit everyone and different packages will seem easier to use to different people.

Schlumberger has added Modeler to MacBravo Detailer to provide a solid-modeling package that has great power and flexibility. When this package is coupled with Dimensions from Visual Information Development, it can create special effects–quality graphics and animations. Autodesk has announced that a new version of Auto/CAD is forthcoming with a real Macintosh interface; we recommend using an 80386-based DOS machine if you need Auto/CAD until that release is available. We do not recommend InCAD until an overhaul of the manuals and the interface is completed.

In the architecture arena, there are two front-runners. ArchiCAD, from Graphisoft USA, is one of the best-designed packages overall, balancing features with usability. While none of its features are outstanding, it is a very complete package for real architectural modeling—by far the best package right now. MacBravo Facilities is close on its heels. If Schlumberger achieves all it claims to be attempting in moving features from its minicomputer VAX products, MacBravo Facilities will be the clear leader in this field.

The illustration market has two clear camps, those designers who create from shapes and solids and those who create from lines and points. It is for the latter group that StrataVision 3d, the most powerful of the illustration packages, has been created. Getting started with this package is easy and fast. Creating drawings is as simple as picking up a pencil and starting to sketch, yet the power of the program is in practice and the artist's eye. Be warned: the first step is easy, but real art is a long, addictive path ahead. StrataVision 3d is an artist's tool.

DynaPerspective, in comparison to StrataVision 3d, has a large array of tools. It was created for the technical illustrators of the world with less artistic but more practical needs. DynaPerspective builds with shapes. Both packages are highly recommended. Swivel 3D Professional is a hybrid of the two approaches; there are few tools in Swivel, yet the product works well with objects—the simple cube and ball can be deformed to create very complex models.

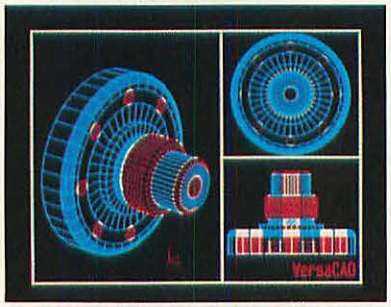
In this article we have generally treated rendering as a separate task from modeling, yet many modeling packages include rendering features. Of the packages surveyed here, DynaPerspective and StrataVision 3d offer the best rendering tools. ModelShop and Swivel 3D Professional are both rapidly improving. For animation front ends, DynaPerspective, Swivel 3D Professional, and StrataVision 3d all offer good options.

For finite elements analysis, MacSAP III is the obvious choice. MSC/PAL is not as capable of building the models it uses for analysis as MacSAP III is. Both packages will take imports via CADmover and neither is complete without this utility. ■

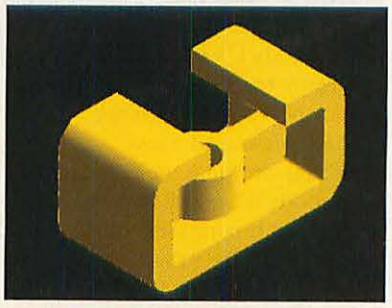
See *Where to Buy* for contact information.

RAND MILLER

It doesn't take a sophisticated model to create a sophisticated image. In this example—produced in StrataVision 3d—most of the visual illusions were produced by a combination of ray tracing and mapping. The tile counter, for example, comprises a single polygon; the appearance of individual tiles was produced using bump and reflectivity maps.



A wire frame being designed in VersaCAD. Note the working environment's multiple views.



A solid model produced in MacBravo Modeler.

A naval architect by training, ***Doug Houseman*** *has been using CAD systems since 1977. He is also president of the MacTechnics user group.*
Anna O'Connell *is a manufacturing engineer for one of the Big Three auto companies.*

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Macworld Lab tests 43 tape backup drives to find out how fast, and how effectively, they protect your data

"I'm sorry, Tom. There's nothing more I can do. I'm afraid that Sparky's gone."

I looked down at the desktop, where Sparky lay. I knew that my friend had done his best, but some crashes were beyond even his abilities. Shaking my head sadly, I opened the desk drawer and took out a small box.

"He left this behind," I said. "I guess you could call it his life's story."

A glimmer of hope grew in my friend's eyes as he saw what I held. "A tape . . ." he whispered.

Sparky the Hard Disk may be crashed and gone, but his data lives on, thanks to my recently acquired habit of backing up to tape. Tape drives provide a convenient, reliable way to protect your data from misfortune. If you only have a 20MB hard disk drive, then backing up to floppies is still a good choice. But if your online storage is 40MB or more, you should consider purchasing a tape drive.

Macworld Lab tested five types of tape drives—DC2000, DC600, Teac, 8mm videotape, and digital audiotape (DAT). We judged them on reliability, capacity, speed, and convenience. In general, we suggest that you purchase a tape backup drive that can fit all of your hard disk's data onto one tape. Swapping tapes during a backup session is a pain, and given human nature, the more hassle backing up is, the less likely it'll get done. We found that if you need to back up 60MB or less, then a Teac 60 or DC2000 drive is your best choice. Hard disks of 80MB

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PHOTOGRAPHS BY STAN MUSILEK

to 150MB are handled well by Teac 150 and the lower-capacity DC600 units. For backing up a 300MB or larger file server, or backing up all of the drives on a network, focus on the 525MB DC600, 8mm, and DAT drives.

Good buys in Teac drives include (clockwise from upper left, previous page) Braemar's SX150, Micro-Net's MPT-155, Ruby Systems' StarDrive 150TX, MacProducts' MagicTape 60, and EMAC's Impact Tape. Above, some of the best DC600 drives include the Tecmar QT-525es, Maynard MaxStream 2500, and Maxcess M250T.

8mm units include Maynard's MaxStream 2200HS, PCPC's Jetstream, and Tecmar's THS-2200.

DC2000—Old Reliable

Popular as personal backup units for almost a decade, the DC2000 drives use small data cartridges that are about the size of a credit card and contain ¼-inch-wide tape. A single DC2000 drive can have two different capacities, depending on whether you use standard or extended-length tapes. And to confuse the issue further, vendors use two different models of DC2000 drives. The older ones can hold 40MB of data or (with an extended-length tape) 60MB. The newer, faster ones take 86MB or 120MB to fill.

No matter what size DC2000 drive you use, however, you can count on two things. The drive will be reliable, and with very few exceptions, it will be slow. As a group, the DC2000 units turned in the poorest results in our speed benchmarks. The worst culprit was the Apple Tape Backup 40SC. The software that comes with this drive is embarrassingly slow; so much so that Apple now includes a coupon for a free copy of Dantz Development's Retrospect with the 40SC, which doubles the drive's backup speed. And the Apple Tape Backup 40SC is the only DC2000 drive that can't accept extended-length tapes.

Fortunately, Apple's drive isn't typical of the DC2000 group. Irwin's Model 5040 and Model 5080 drives use tapes that are interchangeable with the company's tape drives for IBM PCs. Thanks to its FastTape backup software, the Braemar SX40 is an able drive at an appealing price. Fifth Generation Systems' Fastback Tape FB120 uses the MCD II mechanism, is housed in a stylish case, and turns in respectable backup times. The cream of the DC2000 crop, however, is the Tecmar QT-Mac80. Because of Tecmar's excellent backup software, and the MCD II mechanism, this attractively designed drive is the fastest DC2000 unit.

Three unusual DC2000 units from ADIC provide a way to back up large amounts of data. These drives contain multiple drive mechanisms in a single case; the drives automatically begin backing up to the next tape once the first is full. ADIC's MacBack 256 uses two 128MB drives in one case to reach its 256MB capacity. MacBack 8000—which holds 1280MB—works a bit differently. You place up to ten DC2000 cartridges in a magazine, and software shuttle the tapes in and out of a single drive mechanism.

Just as unique is ADIC's approach to network backup. The ADIC software makes the Mac that the drive is attached to into a backup server. A network administrator can then back up all other Macs on the network from the server. Alternatively, each network user can specify a time and date that the backup server uses to automatically back up his or her hard drive. The penalty you pay for ADIC's approach is price; a DAT drive holds the same amount of data as the MacBack 8000, is much faster, and costs about half as much. And the PCPC 8mm Jetstream provides the same network backup capabilities, with double the capacity, for $2000 less than the largest-capacity ADIC drive. (Dantz's Retrospect, which is bundled with many drives, will also soon have network backup capabilities.) Given the better value of the competition, ADIC's MacBack 8000 unit doesn't make much economic sense.

Teac

Popular and reliable, Teac drives are first-rate choices for personal backup. At first, a Teac data cassette may look like a standard audiocassette, but a closer inspection reveals much better construction. Two varieties of the Teac mechanism are currently shipping: a 60MB version; and a faster 150MB version that can read, but not write, the 60MB format. The Teac drives were invariably good performers in our speed tests. The 60MB units were speedier than all but the fastest DC2000 drives, and the 150MB units were faster still.

The Teac 60MB format has lost popularity among manufacturers since our review of tape drives about a year ago (see "Backing Up with Tape Drives," December 1989). Some vendors are phasing out 60MB drives in favor of the 150MB units, because the cost to the vendor is almost the same. But if you only need a tape drive with a 60MB capacity, and can find one at a good price, there's no reason to shy away from these reliable products.

There are many Teac-based drives to choose from, and there isn't too much difference between units from

the various manufacturers. Price is a good guide here, and the low-price leaders are the SX150 from Braemar and the two units, MagicTape 60 and MagicTape 150, from MacProducts. At $995, MicroNet's MPT-155 drive breaks the $1000 price barrier, and you get a fast, sleek unit the size of an external floppy drive. Street prices for Teac 150MB drives are now as low as $699, and are expected to go lower.

DC600

The DC600 is the larger cousin of the DC2000. It uses data cartridges that are twice the size of DC2000 tapes, up to four times higher in capacity, and much faster. Like the DC2000 drives, the DC600 capacity depends on whether you use standard or extended-length tapes and on which mechanism the drive uses. The most common model holds 150MB and (with extended-length tape) 250MB, while a recently released model holds 320MB or 525MB. Bear in mind, however, that some DC600 drives cannot handle extended-length tapes (maximum capacities are noted in "Tape-Backup Drives Compared").

Of the 150MB/250MB drives, we give high marks to the Maxcess M250T, for its good test results and a two-year warranty, and to the Tecmar QT-Mac150, for excellent software, sleek design, and fine performance. The Tallgrass FileSecure 150 (Mac) fared less well; its oversize case and noisy operation make it obtrusive in a quiet office.

The 320MB/525MB DC600 drive is a serious contender for high-speed backup of file servers and archiving of large graphics or sound files. We tested the Tecmar QT-525es and the Racet SA525, and they finished in the top five overall in our file-backup tests. (MicroNet also offers a drive in this size, but we did not receive it in time to test). Racet's backup software, Mac Xpress, was buggy and unreliable. The software put files in the wrong folders when restoring them to the hard disk, and was unable to complete our image-backup tests. And when we tried using the program from a locked floppy, it did not prompt us that the disk was locked, and did not create the required backup log. Without the backup log we were unable to restore the hard disk, even when we used Racet's emergency feature for retrieving log information. Racet claims that it is revising its software; until it's fixed, we can't recommend the drive, despite its excellent showing in our speed tests. On the other hand, we can recommend the Tecmar QT-525es, which worked flawlessly.

FILE BACKUP TIMES

(in seconds)

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	Overall Index	File-by-File Backup	File-by-File Restore
Racet SA525	1.00	251	236
PLI PL DAT	0.85	308	268
PCPC Jetstream	0.84	344	248
Tecmar QT-525es	0.83	305	284
MacProducts MagicTape 1.3 GB	0.82	347	255
MicroNet MD-1300	0.82	324	272
Tecmar THS-2200	0.81	392	241
Tecmar QT-Mac80	0.74	264	444
FWB hammerDAT	0.69	285	462
Braemar SX150	0.69	359	350
Pinnacle Micro DAT-1300	0.68	415	308
Maxcess M250T	0.68	361	354
EMAC Impact Tape 150	0.67	362	367
MicroNet MPT-155	0.66	372	364
Tecmar QT-Mac150	0.65	402	347
Ruby Systems StarDrive 150TX	0.65	363	392
MacProducts MagicTape 150	0.64	386	372
CMS MacStack Tape 150	0.64	361	407
Tecmar DATaVault	0.61	411	391
MacProducts MagicTape 60	0.60	407	398
EMAC 60T	0.60	405	413
Maynard MaxStream 2200HS	0.58	369	482
Tallgrass FileSecure 1300 (Mac)	0.57	455	394
Tallgrass FileSecure 150 (Mac)	0.56	434	436
Procom Technology MDAT 1300/M	0.54	463	431
Maynard MaxStream 250Q	0.51	426	556
CMS MacStack Tape 60	0.50	467	499
Microtech T150	0.49	427	605
ADIC MacBack 256	0.49	472	530
Mirror T150	0.48	452	593
FWB hammerTape 150	0.42	991	403
Relax Tape Plus 150	0.39	433	1176
Mirror T150	0.38	615	679
Fifth Generation Fastback Tape FB120	0.37	653	656
Procom Technology PMT 150/M	0.34	522	1232
Procom Technology PMT 60/M	0.30	590	1315
Relax Tape Plus 60	0.30	676	1042
GCC Technologies HyperTape II	0.27	873	964
Braemar SX40	0.26	955	915
Irwin Model 5080	0.26	1045	853
Irwin Model 5040	0.24	1091	912
Apple Tape Backup 40SC	0.14	1754	1786
Blackhole MacTape/SCSI-9	0.11	2339	2278

Percent slower than fastest

- 0%–25%
- 26%–50%
- 51%–75%
- 76% or more

To test how well tape backups work in real situations, we performed a file-by-file backup and restore on a 40MB hard disk that contained 34MB of data. We found a large difference in speed between the fastest products (red) and the slowest products (gray).

To determine the ranking, we indexed overall performance numbers against the fastest tape drive. Indexed numbers are listed next to the product name.

8mm Video and DAT

For some systems, even the 525MB DC600 drives don't provide enough

Winners in the DAT category include the FWB hammerDat, the PL DAT, the MicroNet MD-1300, and the MacProducts MagicTape 1.3 GB.

FEATURES EXPLAINED

Mirror-Image Backups make an exact copy of an entire hard disk, even including blank areas.

Restores Desktop Positions means that the software returns icons to their original positions on the desktop after a restore.

Maintains AppleShare Privileges means that the software keeps track of all assigned AppleShare privileges.

Backup/Restore over Network means that the tape drive can back up hard disks attached to a network from a central backup server.

Automatic Timed Backup denotes the ability to back up a hard disk at a user-specified time.

Prints Tape Directory means that the software lets you print a hard copy of a tape's contents.

TAPE-BACKUP DRIVES COMPARED

Type	Company	Product	Price	Maximum Capacity [1]
8mm Video	Maynard Electronics	MaxStream 2200HS	$7495	2.2GB
	PCPC	Jetstream	$4279	2.2GB
	Relax Technology	Tape Plus 1200-DAT	$5399	2.2GB
	Tecmar	THS-2200	$6995	2.2GB
DAT	Blackhole Technology	MacTape/SCSI-9	$3495	1.3GB
	EMAC	Metro DAT	$3995	1.3GB
	FWB [3]	hammerDAT	$3995	1.3GB
	MacProducts USA	MagicTape 1.3 GB	$2995	1.3GB
	Maxcess	M-1.2TDAT	$2995	1.2GB
	MicroNet Technology	MD-1300	$3995	1.3GB
	Mirror Technologies	T1200	$2997	1.2GB
	Pinnacle Micro	DAT-1300	$3995	1.3GB
	PLI	PL DAT	$3995	1.3GB
	Procom Technology	MDAT 1300/M	$3995	1.3GB
	Relax Technology	Tape Plus 2200	$3999	1.2GB
	Tallgrass Technologies	FileSecure 1300 (Mac)	$4595	1.3GB
	Tecmar	DATaVault	$4995	1.3GB
DC2000	ADIC	MacBack 128, MacBack 256,	$2295, $3595,	128MB, 256MB,
		MacBack 8000	$6495	1.3GB
	Apple Computer	Apple Tape Backup 40SC	$1499	40MB
	Braemar	SX40	$649	60MB
	Fifth Generation	Fastback Tape FB120	$1395	120MB
	GCC Technologies	HyperTape II	$999	60MB
	Irwin Magnetic Systems	Model 5040, Model 5080	$995, $1295	60MB, 120MB
	Tecmar	QT-Mac40, QT-Mac80	$1395, $1795	60MB, 120MB
DC600	FWB [3]	hammerTape250	$1895	250MB
	Maxcess	M150T, M250T	$1295, $1395	150MB, 250MB
	Maynard Electronics	MaxStream 250Q	$2095	250MB
	MicroNet Technology	MT-150, MT-320	$1695, $1995	150MB, 320MB
	Mirror Technologies	T150	$897	150MB
	Racet Computes	SA525	$2295	525MB
	Tallgrass Technologies	FileSecure 150 (Mac)	$1795	150MB
	Tecmar	QT-Mac150, QT-525es	$2395, $3495	150MB, 525MB
Teac 150	Braemar	SX150	$799	150MB
	CMS Enhancements	MacStack Tape 150	$1499	150MB
	EMAC	Impact Tape 150	$1495	150MB
	MacProducts USA	MagicTape 150	$795	150MB
	Maynard Electronics	MaxStream 150	$1895	150MB
	MicroNet Technology	MPT-155, CPKT-155,	$995, $1095,	150MB, 150MB,
		MT-155 [4]	$1245	150MB
	Microtech International	T150	$1099	150MB
	Procom Technology	PMT 150/M	$1295	150MB
	Relax Technology	Tape Plus 150	$999	150MB
	Ruby Systems	StarDrive 150TX	$975	150MB
Teac 60	CMS Enhancements	MacStack Tape 60	$1159	60MB
	EMAC	60T	$995	60MB
	MacProducts USA	MagicTape 60	$695	60MB
	Maynard Electronics	MaxStream 60	$1595	60MB
	Procom Technology	PMT 60/M	$995	60MB
	Relax Technology	Tape Plus 60	$799	60MB

[1] Maximum capacity includes the drive's capacity with an extended-length tape, if it can use one. [2] E = external, I = internal. [3] Shipped with FWB's own backup software and with Retrospect; features for both are listed. [4] The MPT-155 is the smallest drive and takes its power from the Mac's floppy port; the CPKT-155 is also small but includes a power supply; the MT-155 is a standard zero-footprint drive.

SCSI Termination [2]	Software Manufacturer	Performs Mirror-Image Backup	Restores Desktop Positions	Maintains AppleShare Privileges	Compatible with A/UX	MultiFinder Background Operation	Backup/ Restore over Network	Automatic Timed Backup	Prints Tape Directory	Warranty (in years)
E	Maynard	○	●	●	○	●	●	●	●	1
I	PCPC	●	●	●	●	●	●	●	●	1
E	Dantz	○	●	●	○	●	●	●	●	1
E	Tecmar	●	●	●	●	●	●	●	●	2
I	Blackhole	○	○	○	○	○	○	○	○	1
E	Dantz	○	●	●	○	●	●	●	●	1
E	FWB/Dantz	●/○	●/●	●/●	●/○	●/●	●/●	●/●	●/●	1
E	Dantz	○	●	●	○	●	●	●	●	1
I	Dantz	○	●	●	○	●	●	●	●	2
E	Dantz	○	●	●	○	●	●	●	●	1
E	D-K Research	●	●	●	○	○	●	●	●	1
I	Dantz	○	●	●	○	●	●	●	●	1
I	Dantz	○	●	●	○	●	●	●	●	1
I	Dantz	○	●	●	○	●	●	●	●	1
E	Dantz	○	●	●	○	●	●	●	●	1
E	Dantz	○	●	●	○	●	●	●	●	2
E	Tecmar	●	●	●	●	●	●	●	●	2
E	ADIC	○	○	●	○	●	●	●	●	1
E	Apple	●	●	●	●	○	○	○	○	1
E	Nuvo Labs	●	●	○	○	○	●	○	○	1
E	Fifth Generation	○	●	●	●	●	●	●	●	1
E	Dantz	○	●	●	○	●	●	●	●	2
E	Irwin	○	●	●	●	○	●	●	●	1
E	Tecmar	●	●	●	●	●	●	●	●	2
E	FWB/Dantz	●/○	●/●	●/●	●/○	●/●	●/●	●/●	●/●	1
I	Dantz	○	●	●	○	●	●	●	●	2
E	Maynard	○	●	●	●	●	●	●	●	1
E	Dantz	○	●	●	○	●	●	●	●	1
E	D-K Research	●	●	●	○	○	●	●	●	1
E	Racet	●	●	●	○	○	●	●	●	3
E	Dantz	○	●	●	○	●	●	●	●	2
E	Tecmar	●	●	●	●	●	●	●	●	2
E	Dantz	○	●	●	○	●	●	●	●	1
I	Nuvo Labs	●	●	○	○	○	●	○	○	1
E	Dantz	○	●	●	○	●	●	●	●	1
E	Dantz	○	●	●	○	●	●	●	●	1
E	Maynard	○	●	●	○	●	●	●	●	1
E	Dantz	○	●	●	○	●	●	●	●	1
E	Nuvo Labs	●	●	○	○	○	●	○	○	2
I	Procom	●	●	○	●	○	○	●	○	1
E	Dantz	○	●	●	○	●	●	●	●	1
I	Nuvo Labs	●	●	○	○	○	●	○	○	1
I	Nuvo Labs	●	●	○	○	○	●	○	○	1
E	Dantz	○	●	●	○	●	●	●	●	1
E	Dantz	○	●	●	○	●	●	●	●	1
E	Maynard	○	●	●	○	●	●	●	●	1
I	Procom	●	●	○	●	○	○	●	○	1
E	Dantz	○	●	●	○	●	●	●	●	1

backup space. 600MB hard disks are not unusual anymore—especially as file servers—and storage capacities are inching past a gigabyte. Fortunately, 8mm and digital audiotape (DAT) drives are up to the challenge. (You may also hear these drives referred to as *helical scan drives*. These drives have four read-write heads, mounted on a spinning drum, that create diagonal tracks of data on a tape. Because the tracks are diagonal instead of longitudinal, the 8mm drives can pack 2.2 gigabytes (2.2 billion bytes) of data on the same kind of 8mm videocassette you'd use to tape the kids at Disneyland. And with a media cost of about $8 for a 2.2GB tape, the 8mm drives give you the best cost-per-megabyte ratio. Can't get a feel for a gigabyte? Well, 2.2GB is the equivalent of fifty-five 40MB hard disks, or almost 3000 floppy disks. DAT cassettes fit in the palm of your hand, but hold up to 1.3GB of data.

Since all of the 8mm drive mechanisms are made by one manufacturer, Exabyte, your buying decision should be based mainly on software features, performance, and price. PCPC's Netstream software rated high in our speed tests, and it enables you to back up all of the hard disks on a network. Other speedy 8mm units come from Tecmar and Maynard.

DAT drives have popped up everywhere this year, and more vendors are jumping on the DAT bandwagon every day. All of the units we tested performed well, with the exception of Blackhole's agonizingly slow MacTape/SCSI-9. This drive placed dead last in Macworld Labs' speed benchmarks, even beating out Apple's DC2000 entry for this dubious honor. In addition, the MacTape's software was so confusing that we had to call the company before we could successfully perform a backup. As for the drives we liked, special mention goes to MicroNet's MD-1300, FWB's hammerDAT, and MacProducts' MagicTape 1.3 GB. These drives are all solidly built, include good software, and are fast.

IMAGE-BACKUP TIMES

(in seconds)

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	Overall Index	Image Backup	Image Restore
Tecmar QT-525es	1.00	235	198
PCPC Jetstream	0.86	327	199
FWB hammerDAT	0.85	271	240
Tecmar THS-2200	0.76	386	216
Mirror T1200	0.76	256	335
Tecmar DATaVault	0.71	362	260
Procom Technology PMT 150/M	0.58	363	391
Relax Tape Plus 150	0.57	367	394
CMS MacStack Tape 150	0.57	377	380
Ruby Systems StarDrive 150TX	0.57	377	383
Tecmar QT-Mac150	0.57	394	366
FWB hammerTape 250	0.54	418	388
Tecmar QT-Mac80	0.51	427	423
Mirror T150	0.46	454	480
Procom Technology PMT 60/M	0.45	461	500
CMS MacStack Tape 60	0.43	504	502
Relax Tape Plus 60	0.43	508	497
Braemar SX40	0.21	1039	1009

Percent slower than fastest

- 0%–25%
- 26%–50%
- 51%–75%
- 76% or more

Not all drives have software that supports image backup and restore. Of those that do, the 8mm and DAT drives were generally fastest. Overall image backup and restore are faster than file-by-file backup and restore. For these tests, we backed up and restored 34MB of data.

8mm- AND DAT-BACKUP TIMES

(in seconds)

	Overall Index	File-by-File Backup	File-by-File Restore
PCPC Jetstream	1.00	2246	2309
Tecmar THS-2200	0.95	2655	2192
FWB hammerDAT	0.93	2576	2576
Procom MDAT 1300/M	0.88	2695	2485
Tecmar DATaVault	0.80	2570	3192
Maynard MaxStream 2200HS	0.66	2622	5143

8mm and DAT drives perform faster per megabyte as the amount of data to be backed up or restored increases. For instance, in this test we backed up 340MB of data, but the speeds were not 10 times slower than those for the image or file-by-file backup tests when one-tenth the data was used. We tested a representative drive for each different combination of mechanism and software. Results for drives from vendors not listed here will be identical.

Software

Software for tape backup drives has improved tremendously in recent years. All the drives listed in "Tape-Backup Drives Compared" let you select individual files and folders for backup and restore and let you back up only files that have been added or changed since the last backup session. In addition, all of the drives can continue a backup onto a new tape when the last tape is filled. All except the Apple Tape Backup 40SC can save the backup criteria for reuse.

Backup software, comes with a wide range of interface designs, some of which work better than others. When choosing files to back up, the easiest way is to click on file names displayed in a list; especially helpful is a listing like Retrospect's, which uses an outline indention scheme to show the hierarchy of files and folders. Other ideas, such as Maynard's Finder-like interface, work less well. For instance, after the software has selected files based on a set of criteria that you have specified, you are forced to open each nested folder

DATA REDUNDANCY

If you don't like the idea of messing with tapes but still want an extra copy of your data, then you have another option—purchase two hard disks and some combination of software and hardware that copies everything you do to both hard disks at once. One technique for making this work, *disk mirroring*, is implemented in the hard disk's driver software. The driver forces the Mac to write data to two SCSI drives at once (data is only read from one of the disks, however). If one disk fails, the user is notified and all read and write operations switch to the good disk. Theoretically, a hard disk's write speed is cut in half because each block of data is written twice in succession—but in reality, you won't notice any difference in speed unless you are copying very large amounts of data. Read times remain unaffected and in some cases may be even faster. That's because some vendors are designing their hard disk drivers so that the system reads data from the drive whose heads are physically closest to the data. Mirroring systems have recently been introduced by Storage Dimensions, FWB, Optima, and Profyle.

A second, more expensive, technique, *disk duplexing*, also writes identical data to two hard disks, but instead of daisy chaining both disks from the Mac's SCSI port, you add a NuBus board that provides a second SCSI port to which the second hard disk is attached. Since data is written to both disks simultaneously through the two SCSI ports, write speeds on duplexed systems are not degraded as they are with mirroring. Data is read from both hard disks and compared for errors, thus improving the data's integrity. Duplexing systems are offered by Golden Triangle, FWB, and MicroNet. Many vendors are also bundling Golden Triangle's solution with their drives.

Either scheme provides a more transparent means of backup to the user than do tape drives. With disk duplexing or mirroring, data is copied as you create it. And because you have two identical hard disks, your downtime is minimized if one crashes. Just unplug the failed disk and continue operations with the remaining one until the bad one is repaired. But a duplexed or mirrored system is not as foolproof as a tape drive. Damage from viruses, corrupted disk directories, or even accidentally trashed files will be duplicated on both hard disks. And fire or other disaster could physically destroy both disks. Being able to restore from a backup tape that was kept off site could mean the difference between a temporary setback and a major calamity. A complete solution for installations where data loss is a tragedy includes a mirroring or disk-duplexing system and a tape-backup unit.

to mark additional files that don't meet the criteria or unmark unimportant files that do meet the criteria.

The honors for the best backup software go to Dantz's Retrospect and Tecmar's QT Backup. Both programs offer easy-to-use file-selection lists, have well-designed interfaces, and are optimized for speed. For instance, Retrospect and QT Backup implement *SCSI disconnect-reselect*, a technique that maximizes speed by interleaving transactions on the SCSI bus between the hard disk and the tape unit. This means that the Mac can fetch more data from the hard disk at the same time that the tape drive is writing the last chunk of data it has received. The tape drive's speed at writing data thus becomes the bottleneck, not the Mac's SCSI port. SCSI disconnect-reselect is also used by PCPC's software; it's no coincidence that drives from PCPC and Tecmar as well as drives that use Retrospect are among the quickest.

The Right Choice

If you need compatibility with the Apple or other DC2000 drives, Fifth Generation's Fastback Tape FB120 and Tecmar's QT-Mac80 are good choices. Both of these quick drives overcome the main objection to the DC2000 format—slow speed. But if you're looking for your first tape unit, you'll find better value with another type of drive.

The DC600 format is reliable and the drives are quick. The 250MB and 525MB units fill the gap in backup capacity between the Teac 150MB and the DAT and 8mm units. The 250MB DC600 units, such as Maxcess's M250T and Maynard's MaxStream 250Q, are a good, albeit more expensive, alternative to the Teac 150 units for 200MB or 300MB hard disks. For backing up 300MB to 600MB hard disks, the 320MB/525MB unit from Tecmar delivers very good performance.

For heavy-duty backup chores, such as backing up networks or high-capacity file servers, you should zero in on a DAT or 8mm video drive. FWB's hammerDAT, PLI's PL DAT, and MicroNet's MD-1300 are all fast, solidly built drives from companies with good reputations for service and support. In the larger-capacity 8mm video area, PCPC's Jetstream and Maynard's MaxStream 2200HS stand out because of their good speed and low cost per megabyte of storage. (The PCPC Jetstream, however, can take a long time to perform incremental backups because the software compares the hard disk's old directory with its new directory in order to determine which files have changed since the last backup.)

The Teac data-cassette drives are the best for personal data backup. They're fast, the 60MB and 150MB sizes are just right for most user's hard disks, and they are very reliable. Choose the 60MB version only if you're on a tight budget, since you can buy the faster 150MB drive for as little as $100 more. I especially liked MicroNet's MPT-155, with its terrific combination of small size, great software, and low price; EMAC's Impact Tape 150 for its good speed and nice design; and Ruby Systems' StarDrive 150TX for its zero-footprint design.

Whatever you choose, just make sure to use it. When your hard disk passes on, just as Sparky did, you'll be glad to have an inheritance. ■

See *Where to Buy* for contact information.

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HUGE HARD DISKS

MACWORLD LAB TESTS 56 DISKS ABOVE 150MB TO MAKE SURE YOU GET THE BEST QUALITY AND PERFORMANCE FOR YOUR MONEY

BY LON POOLE

Imagine having a thousand megabytes—almost 1300 floppies—inside a Mac II, IIx, or IIfx, or on your desk in a box one-third the size of a Mac SE. You'll pay as little as $3999 for a hard disk drive with that capacity. Don't need quite that much storage? You can get a 600MB drive instead for $1999, a 370MB drive for $1499, or a 200MB drive for $1059. When *Macworld* last surveyed high-capacity hard drives ("High-Capacity Hard Disks," November 1989), they peaked at 650MB and that capacity cost about $1000 more than it does today. As high-capacity hard drives have matured, their reliability has also improved. Last year about 25 percent of the drives Macworld Lab tested didn't arrive in working order. This year fewer than 4 percent were dead on arrival. In most situations where people are likely to use high-capacity hard drives, speed matters just as much as capacity. Multiuser databases, network file servers, and true color (24-bit) work—painting, photo retouching, and prepress separations—all require lots of disk space and a fast hard drive. (You also need a fast Mac to draw 24-bit color images or otherwise process the data for these activities.) You can't call any big drive slow. The average high-capacity drive Macworld Lab tested was as fast as the quickest of the 80MB to 150MB drives tested earlier this year ("Midrange Hard Disks," June 1990). Generally, drives of 300MB and above performed fastest. The 200MB class was markedly slower

PHOTOGRAPHS BY PAUL FRANZ-MOORE

CLOCKWISE FROM LEFT: PLI PL645 TURBO, FWB HAMMER300, DELTAIC SYSTEMS SERVER 300Q, MICRONET SB330, RACET SA357

overall, with the GCC Ultra Drive 175 being a notable exception.

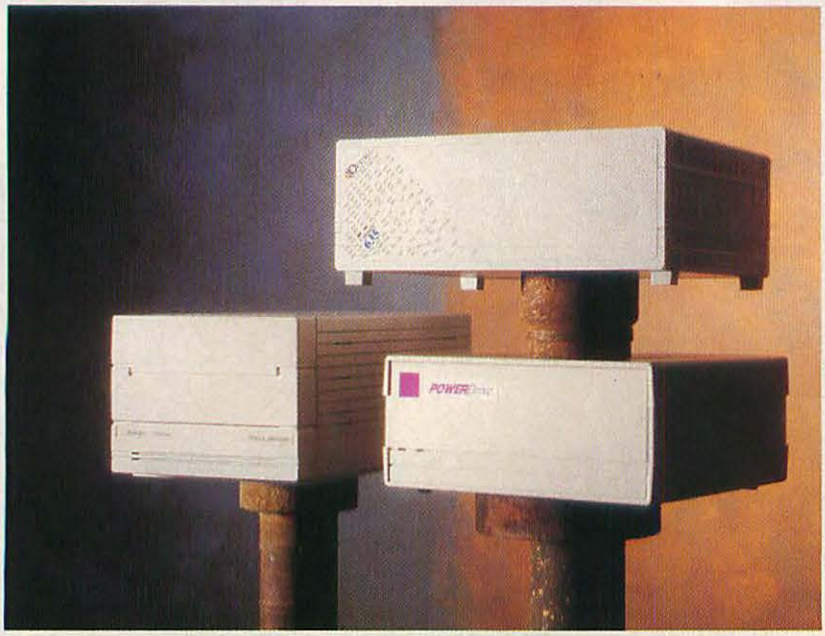
Two of the speed tests—searching a 4th Dimension database and opening Microsoft Excel, Microsoft Word, and Aldus PageMaker documents from the Finder—divided the high-capacity drives neatly into two groups. In those tests, most of the drives were at least 90 percent as fast as the fastest drive. A small number of drives proved to be a dramatic 20 to 30 percent slower than the fastest drive in those tests. Slower drives included the CMS PD 170 and 600, Hard Drives International PowerDrive 320EI and 600EI, iDS PRO 200, La Cie Tsunami 200, La Cie ZFP Plus 600, PLI PL200 Turbo, Mirror MP290 and 590, and Relax Hard Plus 180 and 600.

In file duplicating the fastest drive was almost 100 percent faster than the slowest, and there was an even progression in speed between the two extremes. The drives that were slowest at duplicating files were almost all 200MB and smaller.

Real Performance

Because high-capacity drives are so fast, it makes sense to use them with fast Macs. All the drives Macworld Lab tested transfer data far faster than the Mac Plus SCSI port. All but four of the drives are faster than an SE SCSI port, and over half of the drives are significantly faster. Seven of the drives have transfer rates faster than any Mac except a IIfx.

Transfer rates do not measure actual performance, though. Optimum transfer rates happen only when the drive performs continuous sequential accesses. That doesn't occur when you start up the system, copy or duplicate files, query a database, access files on a busy server, or use a drive for most other real-world tasks. Then the heads must move back and forth across the disk surfaces, slowing down the transfer rate. In addition, the Mac must usually pause briefly to process data. For these reasons, a Mac SE may be a decent match for one of the slower high-capacity drives. Nevertheless, you should use one of the Mac II family to make sure you're not losing performance to the SCSI port.



Optima Concorde 635, HDI PowerDrive 1050EI, Storage Dimensions MacinStor 1020

Reliability

Reliability is a major concern when shopping for hard drives, but it is hard to evaluate. How do you measure the unpredictable and irregular? Manufacturers cite the mean time between failures (MTBF) of the drive components. The MTBF measures an average lifetime of probable reliability, but it is no guarantee of reliability. You cannot compare MTBF numbers because manufacturers calculate them using different tests and formulas.

One way vendors enhance reliability is to use high-quality parts. For example, high-capacity disk platters have a thin-film surface coating that's less likely to develop defects than the conventional coating used in 20MB drives. Even cables and connectors contribute to reliability. The 50-pin connectors found on most drives are rated for 10 times more insertions than 25-pin connectors like the one on the Mac. Also, a 50-pin connector has a separate ground line for each data line, for less susceptibility to cable noise. Of the drives tested, only the La Cie and Procom drives use 25-pin connectors.

Manufacturers decrease the number of unreliable drives by testing for defects. Drives can be tested for defects at two different points in the manufacturing process. The companies that make disk mechanisms test those mechanisms before shipping them to the companies that build finished hard drives. Some drive builders do additional tests on every unit they assemble. Others perform only spot checks. The simplest test, called a burn-in, catches most defects. More extensive testing might include a read-write exercise, a check of start-up and shutdown performance, a measurement of power supply output, and a verification that the operating temperature is within the right limits.

The GCC UltraDrive 200 and the Procom HiPerformance SCSI-II 200 did not work correctly at first. Both worked up to a point, but the GCC 200 hung on opening Excel and the Procom 200 refused to copy files. Swapping the cables didn't help, nor did formatting. In fact, the drives passed the diagnostic test functions of the formatting programs. We exchanged the drives and both replacements worked fine. Ironically, GCC has a reputation for testing its drives thoroughly.

Clearly, a drive can have problems that don't show up during manufacturers' tests or even during some normal use. When a drive breaks down, what matters is how quickly the problem is resolved. If this should happen to you, you'll be glad if the maker of your drive guarantees replacement or repair within a day or two (see "Service and Support").

MACWORLD MW LAB

HARD DRIVE TIMES

Percent slower than fastest

- 0%–10%
- 11%–20%
- 21%–30%
- 30% or more

On some real-world events, you won't see much of a speed difference between drives; just check out our Compile test. On other events, such as duplicating files or folders, the differences are much more noticeable. The order in which the drives are listed is based on overall best performance (top) to overall worst performance (bottom). To determine the ranking, we indexed overall performance numbers against the fastest drive. Thus, the speedy FWB hammer300 gets a 1.00 and the slow Ehman 180 gets a .61. Indexed numbers are listed next to the product name.

According to our SCSI evaluator write tests, all the drives transfer data far faster than the Mac Plus SCSI port. All but four are faster than an SE SCSI port and seven of the drives (denoted by an asterisk) have transfer rates faster than any Mac except a IIfx. So if you use a Mac Plus, any of these drives will be sufficiently fast. Mac IIfx users, however, should choose one of the drives that performed best on SCSI Evaluator reads and writes. Before we performed the tests, we reformatted all the drives. Data was copied onto drives in the same order so that files were physically located in the same place on each drive.

	Overall Fastest	(Seconds) Duplicate	Open	Save	Search	Compile	Seek	(Kilobits per second) SCSI Evaluator Read	SCSI Evaluator Write
1.00	FWB hammer300	58.6	43.5	17.6	51.4	441.0	13.0	15,897	12,424 *
0.98	Deltaic Systems Server 300Q	64.8	41.0	17.1	48.7	418.3	12.0	12,988	11,034
0.97	MicroNet SB330	65.4	40.7	17.0	48.7	413.5	12.0	12,888	10,706
0.97	FWB hammer1000	59.5	43.1	16.6	51.4	436.8	16.0	14,453	12,476 *
0.97	Racet SA657	66.3	41.1	16.3	48.2	417.3	12.0	12,354	11,028
0.96	Racet SA357	67.1	40.9	16.3	48.5	418.9	12.0	11,898	10,933
0.96	Storage Dimensions MacinStor 325	67.2	42.9	17.0	51.8	435.1	13.0	14,432	11,672 *
0.96	FWB hammer600	59.3	41.2	17.4	49.0	421.1	16.0	12,239	12,265 *
0.94	MicroNet MS404	65.7	42.7	16.6	51.0	432.6	16.0	14,481	10,742
0.94	Procom MD320	69.4	43.3	17.0	51.4	435.7	13.0	13,187	10,760
0.93	Procom MD420	68.0	42.7	17.0	51.6	437.4	15.0	13,704	10,756
0.92	Optima DisKovery 420	68.7	43.7	17.2	51.9	457.9	15.0	13,370	11,652 *
0.92	PLI PL645 Turbo	67.7	40.8	17.3	48.7	417.4	16.0	12,253	10,459
0.92	SuperMac DataFrame XP 600	67.5	40.7	17.4	48.8	417.8	16.0	12,144	10,409
0.92	Storage Dimensions MacinStor 1020	69.4	43.1	17.1	51.6	436.2	16.0	13,321	10,900
0.91	Hard Drives Int'l PowerDrive 1050EI	69.4	43.6	17.1	52.1	443.5	16.0	13,323	10,774
0.91	Relax Hard Plus 1200	69.9	43.3	17.2	52.5	447.2	16.0	13,410	10,867
0.91	Racet SA1011	69.5	43.6	16.6	51.4	434.7	16.0	13,172	9950
0.91	CMS PD 1000	69.8	43.2	16.7	51.4	442.2	16.0	13,245	9967
0.90	Hard Drives Int'l PowerDrive 660EM	69.1	42.1	17.7	49.5	437.9	16.0	12,225	10,209
0.88	Rodime Cobra 330e	70.5	43.0	18.3	50.6	444.4	19.0	11,956	11,355
0.88	Rodime Cobra 650e	69.9	42.7	18.3	50.7	442.7	21.0	12,521	10,647
0.88	La Cie ZFP Plus 640	74.5	42.5	19.8	46.7	412.5	16.0	10,377	9900
0.87	Storage Dimensions MacinStor 650	69.8	42.4	18.4	50.7	454.0	21.0	12,605	10,745
0.87	GCC Technologies UltraDrive 175S	62.8	41.8	18.1	50.0	440.8	18.7	9803	9628
0.86	Hard Drives Int'l PowerDrive 320EM	72.4	42.2	20.6	50.3	440.9	17.0	11,069	10,103
0.86	Storage Dimensions MacinStor 195	73.0	42.4	18.4	51.5	444.1	19.0	10,819	10,766
0.85	Optima MiniPak 310	66.7	42.4	19.5	51.7	427.4	25.0	12,652	9449
0.85	Racet SA185	73.1	42.6	18.5	51.2	441.6	19.0	10,706	9468
0.85	Optima Concorde 635	71.9	43.1	20.9	52.4	451.1	20.0	12,481	9717
0.83	Microtech 320	75.9	42.9	21.8	51.3	450.8	17.0	11,080	8370
0.82	CMS PD 300	77.3	43.2	18.6	52.2	445.6	19.0	10,063	8454
0.82	MacProducts Magic 170Q	81.9	43.7	19.6	53.1	456.5	15.0	8572	8635
0.81	Hard Drive Int'l PowerDrive 600EI	80.0	51.5	24.4	67.3	473.0	17.0	12,897	11,530 *
0.81	La Cie Tsunami 170	82.4	42.8	19.3	50.1	461.3	16.0	9016	7537
0.81	Relax Hard Plus 600	80.4	51.6	24.7	68.9	474.2	17.0	12,910	11,619 *
0.80	SuperMac DataFrame XP 330	81.2	42.1	18.0	49.7	445.4	19.0	8279	7280
0.80	Mirror Technologies M590	81.8	51.4	24.3	67.2	470.2	16.0	11,205	11,071
0.80	Ruby Systems StarDrive 170DX	83.3	43.2	19.5	50.4	468.4	16.0	8357	7341
0.78	La Cie ZFP Plus 600	83.8	51.5	24.5	67.1	480.1	17.0	11,135	11,155
0.78	CMS PD 600	82.6	51.3	24.4	67.3	472.5	17.0	11,213	9838
0.77	Hard Drives Int'l PowerDrive 320EI	84.1	52.3	25.4	70.1	471.8	19.0	11,004	11,018
0.77	Hard Drives Int'l PowerDrive 200EC	95.4	44.3	19.6	48.8	456.2	16.0	6897	6624
0.76	MicroNet CPK200	96.4	44.1	19.4	48.6	455.5	16.0	6336	6356
0.75	Ruby Systems StarDrive 200DX	96.5	44.0	19.8	48.3	454.5	17.0	6351	6370
0.75	CMS PD 170	88.4	52.5	25.5	69.9	491.6	18.3	10,351	10,359
0.73	Ruby Systems StarDrive DX170	98.8	43.0	19.8	50.4	464.0	17.0	7416	4084
0.72	Liberty 200R	94.2	43.1	25.3	49.7	454.1	19.0	8102	4195
0.72	Mirror Technologies MP290	88.8	52.3	25.5	70.7	494.8	19.0	9516	8481
0.71	Procom MD200	92.5	43.5	25.5	49.6	463.9	19.0	8098	4207
0.67	iDS PRO 200M	95.9	52.4	27.5	71.5	521.0	18.0	8731	6541
0.67	GCC UltraDrive 200	95.6	45.6	25.0	55.5	509.6	19.0	6518	4002
0.66	La Cie Tsunami 200	95.1	52.5	25.9	70.9	498.0	17.0	6775	5735
0.61	Relax Hard Plus 180	118.9	48.4	23.6	59.9	530.9	26.0	5010	4835
0.61	PLI PL200 Turbo	110.2	54.5	30.5	75.1	523.9	19.0	6034	5998
0.61	Ehman 180	117.7	49.0	23.4	59.3	530.5	26.0	4949	4617

*Indicates drives with transfer rates faster than any Mac except a IIfx.

HARD DRIVES COMPARED

Company	Product	Method of Sale	Dimensions (h×w×d, in inches)	Case Construction [1]	Termination [2]	Partitioning Software	Partition Support for A/UX/ProDOS	Backup Software	Password Protection	Other Commercial Software	Other Features Included [3]
APS	Alliance Drive	dealer/direct	8×8×10.75	P, M	I, E	yes	yes/yes	none	yes	none	UP
Apple Computer	Hard Disk	dealer	3.1×9.7×10.5	P	E	yes	yes/no	HD Backup	no	no	SB, UP
Club Mac	Hard Disk	direct	3.5×10.5×10	P, M	I, E	yes	yes/no	none	no	none	UP
CMS Enhancements	PD	dealer	2×9.88×10.5[4]	M	I	yes	yes/yes	SUM II	no	SUM II	UP
Deltaic Systems	Server	dealer/direct	4.6×9.7×9.7	M	E	no	no/no	none	no	no	UP
Ehman	Ehman	direct	2.5×9.25×9.25	M	I	yes	yes/yes	DS Backup	no	no	UP
EMAC	Metro	dealer	2.8×10.7×9.7	P	E	yes	no/no	none	yes	Norton Utilities	UP
FWB	hammer	dealer	2.25×9.5×9.75[4]	M	E	yes	yes/yes	HD Backup	yes	Hard Disk Util	UP
GCC Technologies	UltraDrive	dealer/direct	2.75×9.5×10.75	P	E	yes	yes/yes	SUM II	yes	SUM II, QuickEnvelope, QuickSpool	SB, UP
Hard Drives	PowerDrive EC	dealer/direct	2.5×9.5×9.5	P	I	yes	no/no	none	yes	no	UP
International (HDI)	PowerDrive EI	dealer/direct	2.5×9.5×9.5[4]	P	I	yes	no/no	none	yes	no	UP
iDS Systems	PRO	dealer	2×5×8	P	I	no	no/no	HD Backup	no	no	FP
	VSP	dealer	2×9.63×9.63	P	S	no	no/no	HD Backup	no	Norton Utilities	UP
La Cie	Cirrus	direct	9×6×2.5	P	I	yes	yes/yes	none	yes	Norton Utilities	UP
	Tsunami	dealer	8×6×2	P	S	yes	yes/yes	none	yes	Norton Utilities	AP, UP
	ZFP	direct	2.5×9.5×9.75	M	I	yes	yes/yes	none	yes	Norton Utilities	UP
	ZFP Plus	dealer	5×9×9.75	M	I	yes	yes/yes	none	yes	no	UP
Liberty Systems	Liberty	direct	5×2×7	M	I	yes	no/no	HD Backup	yes	no	none
MacProducts USA	Magic	dealer/direct	2.5×10.5×9.5	P	E, I	yes	yes/yes	HD Backup	yes	no	AP, UP
MicroNet Technology	CPK	dealer	2.25×6.25×7.75	P	I[5]	yes	yes/no	none	yes	no	UP
	MicroStack	dealer	3.13×10×10.38	P	I[5]	yes	yes/no	none	yes	no	UP
	SB	dealer	7×7.75×12	M	I[5]	yes	yes/no	none	yes	no	UP
Microtech International	Nova	dealer/direct	2.5×9.7×10.5	P	I	yes	no/no	Total Recall	no	Norton Utilities	UP
Mirror Technology	MP	direct	2.5×9.7×10.85[4]	M	I[6]	no	no/no	Volume Backup	no	DiskTop, QuicKeys Lite	none
Optima Techology	Concorde	dealer	4.25×11.4×10.2	P	E	yes	yes/yes	SUM II, HD Backup	yes	SUM II	UP
	DisKovery	dealer	2.5×11.4×10.2	P	E	yes	yes/yes	SUM II, HD Backup	yes	SUM II	UP
	MiniPak	dealer	2.5×6.2×7.8	P	E	yes	yes/yes	SUM II, HD Backup	yes	SUM II	UP
PLI	PLI Turbo	dealer	2.25×9.5×9.75[4]	M	S	yes	no/no	TurboBack	no	TurboSpool, TurboOptimizer, TurboCache	none
Procom Technology	HiPerformance	dealer	2.25×9.7×10.25[4]	P	S	yes	yes/no	none	yes	none	UP
Racet Computes	SA	dealer	5.5×7×16	M	E	no	no/no	none	no	none	UP
Relax Technology	Hard Plus	dealer	3.25×10.25×10.25	M	E	no	no/no	Relax & Save	no	none	AP, UP
	Sierra	dealer	6×2×8	M	E	no	no/no	Relax & Save	no	none	EP, FP
Rodime Systems	Cobra	dealer	7×14.6×4.1	M	I	yes	yes/yes	Fastback II	yes	none	AP, UP
Ruby Systems	StarDrive DF	dealer/direct	2×4.5×7.5	M	I	yes	no/no	HD Backup	yes	none	FP
	StarDrive DX	dealer/direct	2.25×10×10.5	M	I	yes	no/no	HD Backup	yes	none	AP, UP
Storage Dimensions	MacinStor HC1	dealer	5.7×7.7×14.7	P	E	yes	yes/no	Mac Tools Deluxe	yes	Mac Tools Deluxe	UP
	MacinStor ZFP	dealer	3×9.7×10	P	E	yes	yes/no	Mac Tools Deluxe	yes	Mac Tools Deluxe	UP
SuperMac Technology	DataFrame XP	dealer	8×3×9.5	M	I	yes	yes/no	DiskFit	yes	SuperLaserSpool, SuperSpool	UP
Third Wave	ZFP Series	dealer/direct	4.5×9.75×9.75	M	I	yes	yes/yes	none	yes	none	UP
Total Peripherals	TP-170QX	dealer	3×10×10.5	M	I[6]	no	no/no	none	no	none	UP

[1] P = plastic, M = metal. [2] E = external, I = internal, S = switchable. [3] AP = auxiliary power outlets, EP = external power pack, FP = takes power from floppy port, SB = security bracket, UP = universal power supply. [4] Larger capacity drives have a larger case. [5] Plans to make termination self adjusting starting August 1990. [6] Plans to use external termination by year end.

Software

Software is an important part of a hard drive package. All drives come with a utility program for setting up (formatting and initializing) and testing the drive. Some of these utility programs are very basic with crude interfaces, and others are quite elaborate with custom 3-D buttons. You don't use these utility programs very often (perhaps never), so the interface doesn't have to be beautiful as long as you can understand it.

The best utility software lets you partition a disk into multiple volumes, each acting like a separate disk. Without partitioning, the Macintosh gets bogged down organizing thousands of files on a big hard disk. Imagine trying to use a filing cabinet with one 8-foot drawer instead of four 2-foot drawers. You would have to walk back and forth to get from *A* to *Z*. Partitioning a big drive into volumes containing 2000 files or fewer keeps it fast. In a network environment, partitions let users mount only the volumes they need and can simplify the administration of access privileges. The most versatile partitioning software

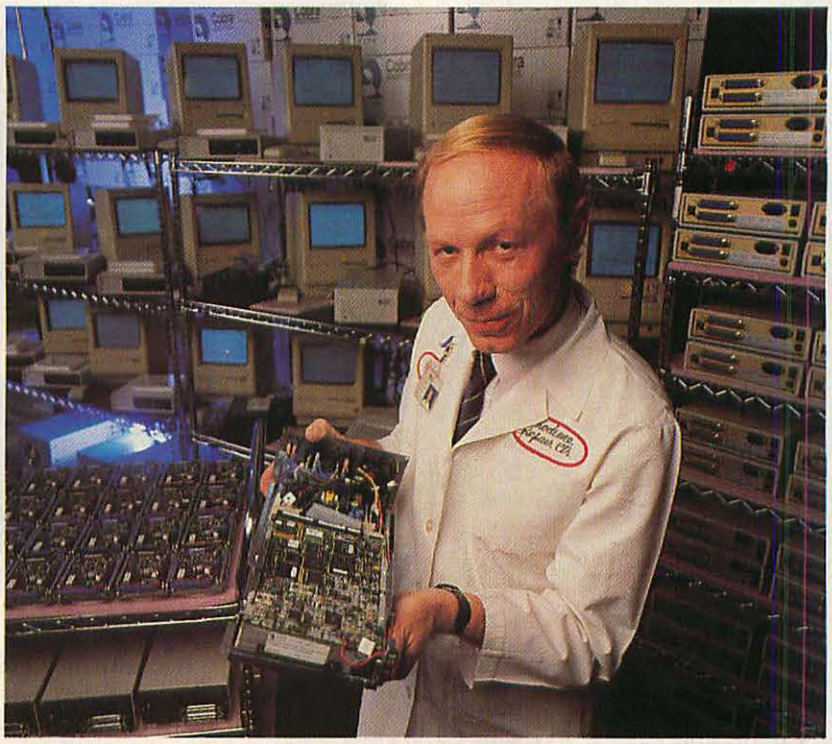
lets you create volumes for operating systems such as A/UX (Apple's version of UNIX) and ProDOS (for the Apple II) on the same disk with regular Macintosh volumes.

There are two methods for implementing disk partitioning: *hard partitioning* and *soft partitioning*. With hard partitioning, the Mac keeps a separate directory of files for each volume on the disk. You can't resize hard partitions without reinitializing the disk, which erases all volumes. In contrast, soft partitions can be resized without affecting volume contents. The major drawback of soft partitions is that the Mac keeps only one directory for the whole disk, and if something happens in one volume to corrupt the directory, all volumes may become unusable. This is particularly a problem on a network file server; you don't want one user's adventure to destroy everyone's work.

Most partitioning software also provides optional password protection of volumes. People who don't know the correct password can't use the volume, or they may be given access to documents but not be permitted to save to or otherwise change the volume. Password protection discourages but doesn't prevent unauthorized access to volumes. Savvy and persistent users can see the contents of a password-protected disk by using disk utility programs like SUM II and Mac Tools Deluxe. FWB and SuperMac include programs that take security a giant step beyond password protection by encrypting the volume contents.

Backup or archiving software is as important as partitioning software. A number of vendors include Apple's HD Backup program, but it's useless for hard disks larger than 80MB because it only backs up onto floppy disks. With it, you'd need at least 115 high-density (1.4MB) floppies plus patience no human possesses to back up a 160MB hard disk. With larger hard disks, the situation gets even more ludicrous. You need a backup or archiving program that works with a tape drive, removable-cartridge hard drive, second hard disk, or other viable backup device.

A few vendors also enclose disk- and file-utility packages such as SUM II, Mac Tools Deluxe, and Norton



ACEY HARPER

Some vendors burn in hard drives to test for defects. At Rodime, assembled drives undergo up to 40 hours of tests. Dave Louden, Rodime's manufacturing manager, oversees the whole process from tests of the drive mechanism to a final check of the drive's packaging.

DRIVE CHAINS

Connecting multiple SCSI devices to a Mac involves setting SCSI ID numbers and delving into the black art of termination. All vendors except SuperMac use convenient external switches for setting the ID number. Setting the SuperMac ID with a utility program is less convenient. About half of the external drives we surveyed have built-in internal SCSI termination. Compared to other alternatives, internal termination is cheaper for the vendor and more convenient for you unless you want to use more than two SCSI devices—including an internal hard disk—with your Mac. When more than two devices are connected, the ones in the middle must not have terminators. The process of removing internal termination so you can connect a drive between two other SCSI devices ranges from fairly easy to scary. On an iDS PRO, for example, you simply pry open a small cover on the bottom of the drive and use a pair of pliers to pull out three small electronic parts. With many other drives, you must open the entire case to remove those small parts.

Several vendors—Deltaic, FWB, GCC, MacProducts, Optima, Racet, Relax, and Storage Dimensions—handle termination the way Apple has always suggested doing it, with external terminators. Mirror plans to be using external termination by the time you read this. External terminators are simple to use: you attach one to the SCSI connectors if the drive is the last SCSI device or if it's the first device connected to a Mac with no internal hard disk.

The iDS VSP, the La Cie Tsunami, all PLI, and all Procom drives have switchable termination. MicroNet plans to add a custom circuit that automatically handles termination on drives made after August 1990.

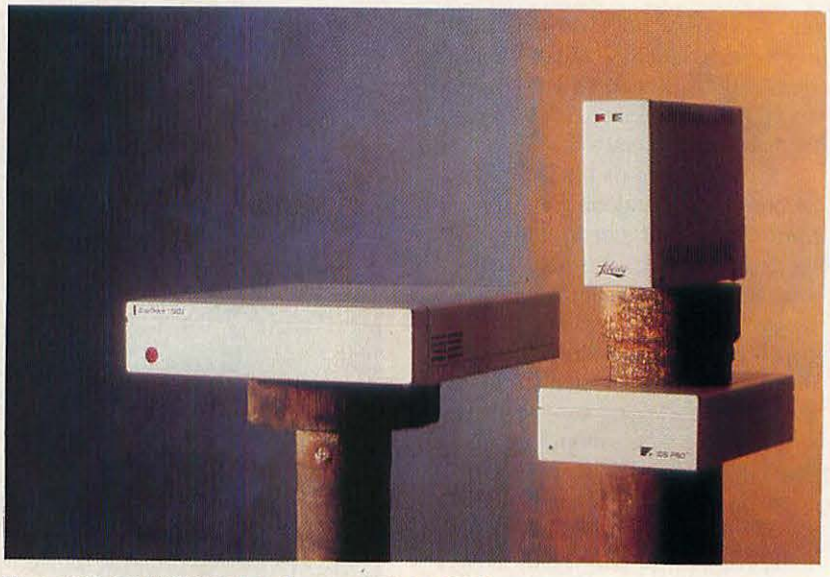
Apple advises Mac IIfx owners not to connect any external SCSI device that's internally terminated. You should remove the internal termination from your external hard disk if it has it. Then you attach the special black terminator that comes with the IIfx to the last SCSI device.

NOISE TEST

In a home office, you'll definitely hear any of these drives except the iDS PRO 200M and the MicroNet CPK200. We don't recommend a drive measuring over 40 dB for a quiet environment. The sound a drive makes is less bothersome amidst the noise of an office, but drives measuring above 48 dB will make themselves heard almost anywhere.

Times louder than quietest:
1–2 times 2–3 times 3–4 times 4 times or more

	Decibels
iDS PRO 200M	32.6
MicroNet CPK200	33.4
Liberty 200R	38.3
Procom MD200	38.4
Ehman 180	38.7
Racet SA357	39.4
CMS PD 170	39.6
Optima MiniPak 310	39.6
Ruby Systems StarDrive 170DX / 200DX	40.1
Racet SA1011	40.2
GCC UltraDrive 200	40.2
Relax Hard Plus 180	40.9
MacProducts Magic 170Q	41.1
FWB hammer600	41.7
GCC Technologies UltraDrive 175S	41.9
FWB hammer300	42.2
La Cie Tsunami 200	42.3
FWB hammer1000	42.7
CMS PD 600	43.0
Ruby Systems StarDrive 170DX	43.1
Procom MD320	43.1
MicroNet MS404	43.1
MicroNet SB330	43.5
La Cie ZFP Plus 600	43.6
Relax Hard Plus 600	43.6
Hard Drives Int'l PowerDrive 1050EI	43.8
La Cie Tsunami 170	43.8
Relax Hard Plus 1200	44.1
Mirror Technologies MP290	44.2
Racet SA657	44.2
Mirror M290	44.2
PLI PL200 Turbo	44.3
Hard Drives Int'l PowerDrive 320EI	45.0
Hard Drives Int'l PowerDrive 660EM	45.2
CMS PD 1000	45.2
SuperMac DataFrame XP 600	45.4
HDI PowerDrive 200EC	45.7
CMS PD 300	45.7
Hard Drive Int'l PowerDrive 600EI	45.7
Optima DisKovery 420	45.8
Rodime Cobra 330e	46.0
Deltaic Systems Server 300Q	46.2
Hard Drives Int'l PowerDrive 320EM	46.8
Rodime Cobra 650e	46.9
La Cie ZFP Plus 640	47.5
Storage Dimensions MacinStor 650	47.8
Procom MD420	47.9
SuperMac DataFrame XP 330	48.1
Optima Concorde 635	48.4
Storage Dimensions MacinStor 1020 /325	48.4
Microtech Nova 320	48.7
PLI PL645 Turbo	50.1
Racet SA185EC	54.6



Liberty 200R, iDS PRO 200M, Ruby Systems StarDrive 200DX

Utilities. These packages' features vary somewhat, but typically include backup, partitioning, password protection, optimization, and data recovery—all options that get handier as the drive gets bigger.

If the drive you like doesn't include the software you need, you can buy the software separately. Expect to pay $50 to $100 for partitioning software that provides password protection, $50 to $200 for a backup or archiving program, $50 to $125 for encryption software, and $75 to $100 for a disk-utility package.

We had trouble with some of the utility software. After we partitioned the Liberty 200, the desktop had icons for the original, unpartitioned disk as well as our newly created partitions. Restarting got rid of the original disk icon, but we also lost all the files we had copied to various partitions before restarting. From then on the partitions worked reliably. Liberty plans to improve its partitioning software by the time you read this.

Relax's backup program, Relax & Save version 1.05, showed signs of poor quality control. Choosing the Backup command resulted in a sequence of cryptic and confusing error messages. Choosing the Help command only made the Mac beep. We can't recommend this program for backing up anything you care about.

When we deleted an A/UX partition on the MicroNet CPK200, all partitions and their contents were lost. The entire disk became one empty partition. MicroNet says we shouldn't have been partitioning the drive with MultiFinder active. The company plans to add a warning to the manual.

In or Around

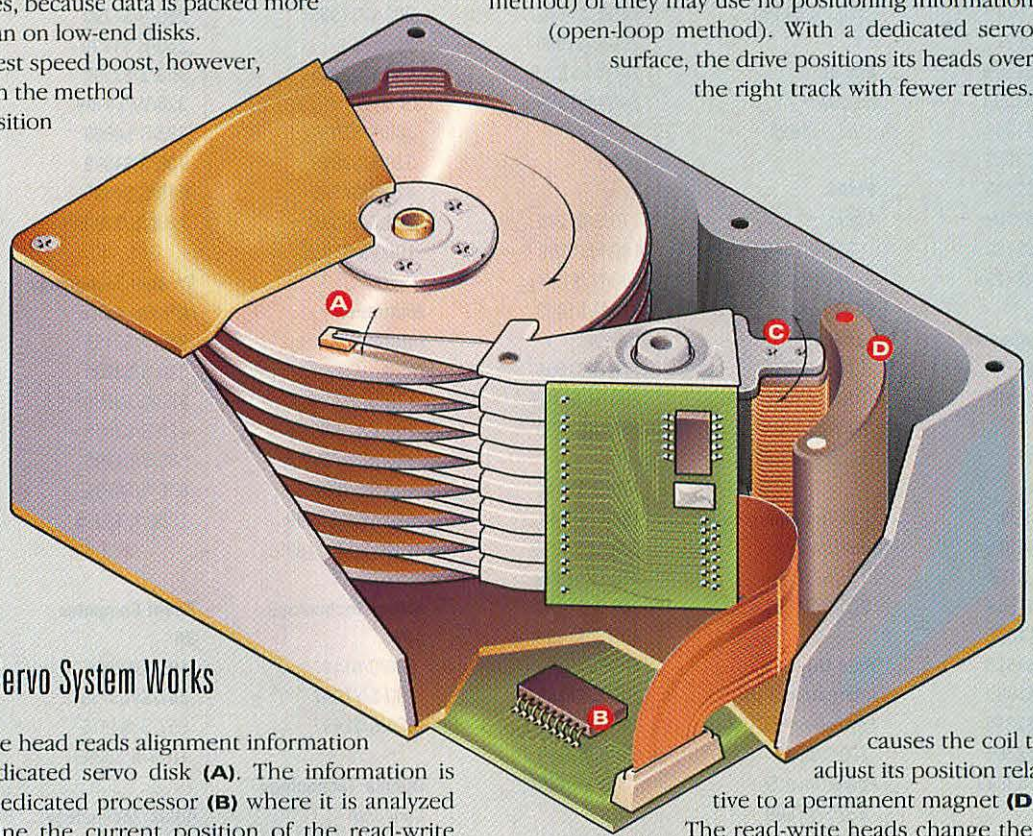
When you're sizing up hard drives, you must consider form as well as function. Where are you going to put hundreds of fast megabytes? Most drives are available in internal and external versions. An internal drive has some advantages: nothing to plug in, nothing to turn on, nothing to clutter your work space, and nothing extra to pack when you move the system. But an internal drive must be installed by someone technically competent, or at least technically brave. Installation in an SE or SE/30 is particularly daunting and may void the Mac's warranty unless done by a dealer.

Furthermore, most internal drives above 250MB that you can buy today won't fit inside anything smaller than a Mac II, IIx, or IIfx. Drives larger than 400MB use full-height 5¼-inch disk mechanisms and most drives between 250MB and 400MB use 5¼-inch half-height mechanisms. However, only a 3½-inch half-height mechanism will fit the standard internal disk bracket in an SE, SE/30, IIcx, or IIci. The maximum capacity of 3½-inch drives—presently Optima's MiniPak 310 —will soon jump as hard drive vendors start using new 330MB and 425MB mechanisms they're due to receive from

SPEED SECRETS

High-capacity hard disk drives owe their speed to technology. These drives position the read-write heads with voice coil actuators, which are faster and more precise than the stepper motors used in smaller drives. Heads travel less on high-end disks, yielding faster access times, because data is packed more densely than on low-end disks.

The biggest speed boost, however, comes from the method used to position the heads over the data tracks. This method, called dedicated servo surface, uses one disk platter solely for aligning the heads over data tracks on other platters. In contrast, lower-capacity disks may use part of the data platters for positioning information (embedded servo method) or they may use no positioning information (open-loop method). With a dedicated servo surface, the drive positions its heads over the right track with fewer retries.



How the Servo System Works

A read-write head reads alignment information from a dedicated servo disk **(A)**. The information is sent to a dedicated processor **(B)** where it is analyzed to determine the current position of the read-write heads on the other platters. The processor instructs an amplifier to vary the voltage in the servo coil **(C)**. The strength of the coil's magnetic field changes and causes the coil to adjust its position relative to a permanent magnet **(D)**. The read-write heads change their position in relation to the coil. With every change of position, the read-write heads send new signals to the servo disk, starting the loop over again.

Quantum in November.

The 5¼-inch half-height internal drives from MicroNet, PLI, and Relax can be shoehorned into a smaller Mac using a special bracket. But there are problems with this setup. An internal 5¼-inch drive with a IIcx or IIci that has multiple NuBus boards may require a beefier power supply, which MicroNet sells separately.

External drives install easily on any Macintosh that has a SCSI port. (Timing problems prevent some drives from working with an old Mac Plus, but a big drive's speed is wasted on the comparatively slow SCSI port of a standard Plus anyway.) Portability makes an external drive practical if you work with more than one Mac system. You can move your entire Mac world

START-UP DEVICE

Oops! Many of the drives tested by Macworld Lab can't be made the start-up device using the Control Panel. The exact reasons for the difficulty vary from one drive make to the next, but the root of all the problems is that Apple doesn't adhere strictly to the SCSI standard as it has evolved. Maxtor, Seagate (also Imprimis), and other disk mechanisms are available in Mac versions as well as general SCSI versions. When vendors put a general SCSI mechanism in a Mac hard drive, timing problems may prevent the drive from working as a start-up device.

You can sometimes work around start-up problems by setting the SCSI ID number of the recalcitrant drive to 0. If that's not possible because the Mac has an internal hard disk set to ID 0, you can try removing the System Folder from the internal hard disk so it's no longer a valid start-up disk. Because this situation is so murky, we recommend arranging in advance with whoever sells you the drive for the option to return or exchange in the event that it doesn't work as a start-up device.

HARD DRIVE PRICES

Alliance Peripheral Systems (APS)
Alliance Drive
170/Q/$949
173/Si/$1259
200/M/$1099
300/Si/$1549
330/Si/$1999
425/Si/$2395
600/Si/$2199
630/Si/$2749
1000/Si/$4295

Apple Computer
Hard Disk
160/Q/$2699

Club Mac
Hard Disk
170/Q/$909
195/M/$1075
204/R/$1039
330/Si/$1549
337/Si/$1695
345/M/$1595
613/Si/$1995
645/M/$2395
676/Si/$2369
1000/Si/$3849

CMS Enhancements
PD
170/S/$2389
200/C/$2199
300/S/$3299
600/S/$5399
1000/S/$8599

Deltaic Systems
Server
300/S/$1999
300/Q/$2299
600/S/$2599
1200/S/$4499

Ehman
Hard Disk
180 /F/$899

EMAC
Metro
170/Q/$1849

FWB
hammer
188/S/$2395
300/S/$3495
600/S/$4895
1000/S/$8495

GCC Technologies
UltraDrive
175/S/$1599
200/H/$1699

Hard Drives International (HDI)
PowerDrive EC
200/C/$949
PowerDrive EI
320/S/$1499
320/Mi/$1599
600/S/$1999
600/Mi/$2295
1050/S/$3899
PowerDrive EM
320/Mi/$1499
660/Mi/$2099

iDS Systems
PRO
180/F/$1825
200/C/$1915
200/M/$1985
VSP
180/F/$1895
200/C/$1985
200/M/$2075
340/Mi/$2995

La Cie
Cirrus
170/Q/$1249
180/F/$1299
200/M/$1399
210/Q/$1499
Tsunami
170/Q/$1599
200/M/$1799
210/Q/$1899
ZFP
170/Q/$1149
180/F/$1149
200/M/$1299
210/Q/$1399
300/S/$1699
400/S/$1999
ZFP Plus
600/S/$2399
640/HP/$2899
650/S/$2999
1000/S/$4499

Liberty Systems
Hard Disk
200/R/$1599
250/H/$1999

MacProducts USA
Magic
170/Q/$927

MicroNet Technology
CPK
200/C/$1995
MS
404/S/$3795
SB
300/S/$3095
330/S/$3595
620/S/$4195
644/S/$6595
1000/S/$7995

Microtech International
Nova
170/Q/$1499
200/Q/$1699
320/Mi/$2299
400/S/$2599
650/Mi,S/$3999
1200/S,Mi/$4899

Mirror Technology
MP
200/C/$1197
290/S/$1997
590/S/$2497

Optima Technology
Concorde
635/O/$5995
1050/O/$8995
DisKovery
200/O/$2395
325/O/$3995
420/O/$5195
MiniPak
200/O/$2395
310/O/$4395

PLI
PLI Turbo
200/H/$1799
250/H/$1999
300/S/$2999
320/W/$4999
383/S/$4899
400/S/$4999
645/S/$4599
1200/S/$7999

Procom Technology
HiPerformance
200/R/$2195
320/S/$3295
320/S/$3595*
420/S/$3595
585/S/$4295
650/S/$4695
1000/S/$6995

Racet Computes
SA
185/S/$2995
357/Si/$3195
657/Si/$4975
1011/S/$8995

Relax Technology
Hard Plus
180/F/$1597
300/S/$2799
350/F/$2799
600/S/$3600
650/F/$3600
1200/F/$5379
1200/S/$7000
Sierra
180/F/$1549

Rodime Systems
Cobra
330e/M/$3999
650e/M/$5899

Ruby Systems
StarDrive DF
170/Q/$1605
200/C/$1945
StarDrive DX
170/Q/$1659
170/S/$2169
200/C/$1999

Storage Dimensions
MacinStor
325/S/$3499
650/M/ $5399
1020/S/$8899
MacinStor ZFP
195/M/$2019

SuperMac Technology
DataFrame XP
200/M/$2099
330/Mi/$3599
600/S/$5699

Third Wave
ZFP Series
170/Q/$999
173/Si/$1259
300/Si/$1499
330/Si/$1899
425/Si/$2399
600/Si/$2099
650/Si/$2699
1000/Si/$4099

Total Peripherals
TP-170QX
170/Q/$1299

**Includes a higher performance Seagate mechanism.*

C = Conner, F = Fujitsu, H = Hitachi, HP = Hewlett-Packard, M = Maxtor, Mi = Micropolis, O = Optima, Q = Quantum, R = Rodime, S = Seagate (formerly Imprimis or CDC), Si = Siemens, W = Western Digital

by toting the external drive. And should either the Mac or the external hard drive break down, you can still use the other. That's much harder to do with an internal drive.

If you opt for an external drive, you still have to decide which case size and shape you prefer. Almost all drive capacities are available in the now classic zero-footprint case. It stacks neatly under an SE/30 but hunkers awkwardly alongside any of the Mac II models. The zero-footprint drives from Optima, PLI, and Procom can stand vertically to take up less desk space. (Optima, however, warns that its DisKovery models are unstable when placed vertically.) SuperMac's vertical case design also has a small footprint.

Although a vertical drive conserves desk space, it doesn't match the shape of any Mac. For a more integrated look, Storage Dimensions houses its large drives in a zero-profile shoebox-shaped case whose height and depth match any Mac II. The Racet SA drives match the Mac II in height but are a couple of inches deeper. Mirror and MicroNet also use the shoebox shape for their

Service and Support If a hard drive gives you trouble, you'll want help and you'll want it fast. All vendors in this survey except Apple provide technical support by phone. In a few cases, the phone call is toll-free. We called each vendor's technical support (without letting them know we were from *Macworld*) and presented a hypothetical problem. This informal test allowed us to grade responsiveness. We graded on a combination of readability, organization, and completeness.

larger drives, but their cases are taller than a Mac II.

A few 200MB to 250MB drives are available in compact cases. The iDS PRO 200 is about the size of an external floppy drive. The MicroNet CPK200, Optima MiniPak, and La Cie Cirrus and Tsunami drives are a bit larger, but can all stand vertically or lie horizontally. The Liberty 200 and 250, which are vertically oriented, are the smallest in this survey.

Our Favorites

If speed were the only consideration, we'd pick the Deltaic Server 300Q. The FWB hammer300, MicroNet SB330, and Racet SA357 are about as fast but cost about $1000 more. Of the smaller drives, we'd select the GCC UltraDrive 175S for speed. At the 600MB-to-700MB level, the PLI Turbo 700 is the best value, though it was the noisiest drive we tested. The FWB hammer600 and Racet SA657 are quieter and slightly faster, but cost about $1000 more.

Of the jumbo drives, we'd choose the FWB hammer1000 or Storage Dimensions MacinStor HC1 1020 for their speed, software, and attractive cases. The Hard Drives International PowerDrive 1050 EI is also worth considering. It's a bit slower, comes with less software, and hasn't the fit and finish of the other jumbos, but costs an astonishing $4500 less. For aggressive pricing, nobody we surveyed comes close to Hard Drives International. (In making our price-performance comparisons, we used the vendors' suggested retail prices. You should make your own comparisons using dealers' actual prices, which are often discounted significantly. Be sure to add the cost of partitioning and backup software if you're considering a drive that lacks them.)

We have to mention the iDS PRO 200, which we liked for its quietness, small size, and case design. But its speed, though not out of line for a 200MB drive, made it one of the slowest drives that Macworld Lab measured. The Liberty 200, though not as sleek, takes up less desk space than the PRO 200, is somewhat faster and costs about $400 less.

A number of vendors make handsome drives. The large shoebox-shaped drives from Racet and Storage Dimensions coordinate particularly well with any of the Macintosh II models. The better looking zero-footprint drives come from FWB, GCC, La Cie, Microtech, Optima, PLI, Ruby, and Storage Dimensions. La Cie also makes the sporty Cirrus and Tsunami compact drives.

Whether you pick one of the huge hard drives we've singled out or another one listed in the product table, you'll notice an empty feeling in your wallet but a comfortable fullness in the Finder. Enjoy your megabytes of elbowroom. ■

See *Where to Buy* for contact information.

Contributing editor **Lon Poole** *has reviewed SCSI hard drives since they first became available for the Mac (four years ago and counting). His latest book,* Amazing Mac Facts, *will be published soon by Microsoft Press.*

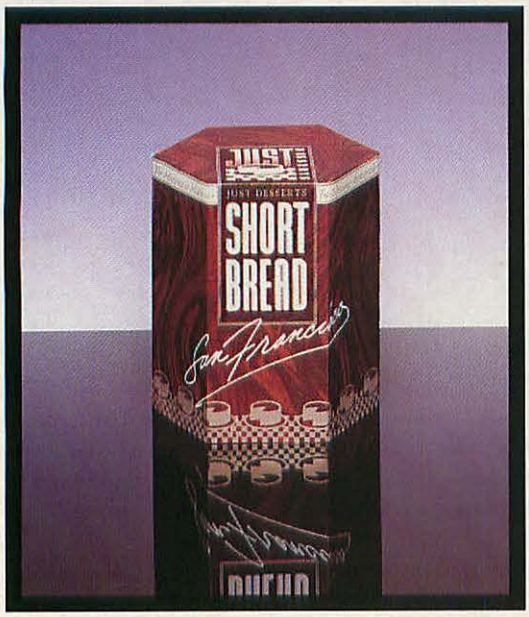
SERVICE AND SUPPORT

Company	Warranty (in years)	Extended Warranty Available	Repair Turnaround (in days)[1]	Data Recovery on Request	Toll-free Telephone Support	Documentation Rating	Telephone Support Rating
APS	1–2[2]	no	2	charge	yes	not tested[3]	not tested[3]
Apple Computer	1	yes	variable	variable	no	not tested[3]	not tested
Club Mac	1–2[2]	yes	variable	free	no	not tested[3]	not tested[3]
CMS Enhancements	1	yes	2	no	no	★★★★	★★★★
Deltaic Systems	1	yes	3	free[2]	no	★★★	★★★★
Ehman	1	no	3	no	no	not tested[3]	not tested[3]
EMAC	2	no	5	no	no	not tested[3]	not tested[3]
FWB	1	yes	2	free	no	★★★	★★★★
GCC Technologies	2[4]	no	2	charge	yes	★★★★	★★★
Hard Drives International	1[5]	no	2	no	yes	★★	★★★★
iDS Systems	2–5[2]	yes	2	free	yes	★★★★	★★★
La Cie	2–5[2]	yes[6]	3	charge	yes	★★★★	★★★★
Liberty Systems	1	no	0	no	no	★★	★★★★
MacProducts USA	2	yes	0–2	free	no	★★★	★★★★
MicroNet Technology	1	no	2	no	no	★★★	★★★★
Microtech International	5	no	2	free	yes	★★★	★★★★
Mirror Technologies	2	yes	2	charge	no	★★★	★★★
Optima Technology	1	yes	0[7]	no	no	★★★★	★★★★★
PLI	1	yes	2	free	yes	★★	★★★★
Procom Technology	1	no	2	no	no	★★★	★★★
Racet Computes	3	no	1[7]	charge	no	★★★	★★★★
Relax Technology	1–5[2]	yes	2	charge	no	★★	★★★★
Rodime Systems	1	no	1–3[7]	free	no	★★★★	★★★
Ruby Systems	1	no	2	free	yes	★★★★★	★★★★
Storage Dimensions	2	no	0–2	free	no	★★★★	★★★★
SuperMac Technology	1	no	2	free	no	★★★★★	★★★
Third Wave	1–2[2]	no	1	charge	yes	not tested[3]	not tested[3]
Total Peripherals	2	no	3	free	no	not tested[3]	not tested[3]

[1]Excludes shipping time to and from dealer. Times may be less through participating dealers. 0 indicates same-day service. [2]Depends on which disk mechanism the drive contains. [3]Not received in time to test. [4]30-day money-back guarantee on direct purchases. [5]30-day money-back guarantee. [6]Available only for internal Quantum drives. [7]Repairs only through participating dealers. ★ = poor ★★ = fair ★★★ = good ★★★★ = very good ★★★★★ = excellent

ONE-STOP PACKAGING

Producing 3-D packaging on the Mac is now a snap and here's how



PIERRE-YVES GOAVEC

BY ERFERT FENTON

The package is the product. So believes Primo Angeli, the founder of Primo Angeli Inc., a Mac-based design firm that has produced packaging and corporate identities for such clients as Conoco, Carnation, Eastman Kodak, Del Monte, General Foods, and Hyatt Hotels.

It's true that good packaging can make or break a product. The design must not only grab the consumer's eye—and cash—it must also accurately convey a sense of what's in the box, can, or bottle. Unlike their peers in other areas of graphic design, package designers must deal with unique issues. They work in three dimensions, from the concept stage to 3-D mock-ups to the final, engineered package.

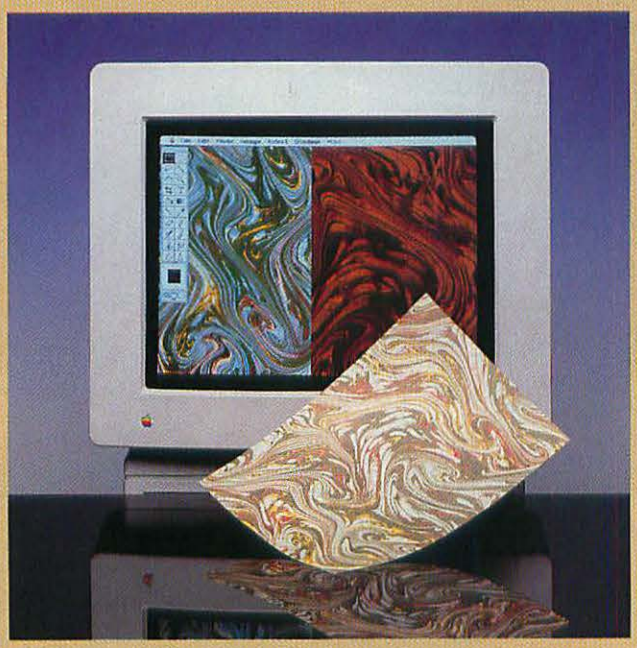
DRAKE SOREY

Designers at Primo Angeli Inc. rely on the Macintosh to produce packaging for a wide variety of corporate clients (this page). For the project outlined in this article, the Mac was teamed with a Scitex system, Cornerstone, to develop a shortbread box (opposite page).

A PACKAGE DESIGN UNFOLDS

1 REFINING THE LOGO

As part of Primo Angeli Inc.'s mission to create a more sophisticated look for the Just Desserts package line, Ray Honda updated the bakery's logo. Philippe Becker then modified Honda's design in Adobe Illustrator 88, reducing the image, altering the colors, and adding a blended fill to the word *Just*.



PIERRE-YVES GOAVEC

2 CREATING THE BACKGROUND PATTERN

To produce the chocolate-swirl background for the box, Becker used a Sharp color scanner to capture the swirls on a piece of marbleized wrapping paper. To change the background color from an unappetizing green to a multihued chocolate brown, he modified the 32-bit TIFF image in Adobe Photoshop.

They must also be prepared to make changes to a package design, whether it's a complete redesign, a product-line extension, promotional packaging, or product maintenance (a change in ingredients, for example).

In an attempt to address these issues, Angeli introduced computers to his design firm five years ago. He started with an IBM PC and worked his way up to 12 Macs. It might be difficult to recognize the Macs at first—one of the designers, in a fit of fashion-consciousness, painted them black one weekend—but the programs on the screens are all familiar.

Primo Angeli designers rely on color graphics programs such as PixelPaint Professional, Adobe Illustrator 88, Aldus FreeHand, Swivel 3D, and Adobe Photoshop to do everything from roughing out designs to creating detailed comps. During the concept phase, when an artist is trying out design options, changes can be implemented quickly. The designer may need to resize a graphic element, change a color, or switch typefaces immediately, rather than redrawing an entire sketch. According to Angeli, "It's important for a designer to have plenty of time to play, to explore and let unexpected things happen. With the computer, if a design's not right on the button, you now have the time to experiment." Communication is another factor. "With the computer you can create a tight comprehensive, rather than a rough drawing. Everybody can see it and make their comments, whereas when it's rough, everybody's working from his own fantasy of the design."

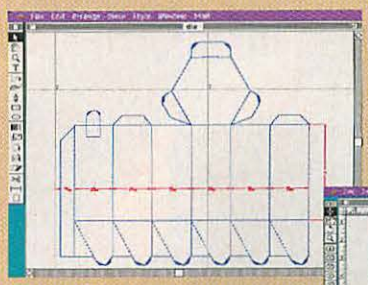
The Mac has had an impact on production as well as design at Primo Angeli. According to production manager Eric Kubly, "We're now in a state where a lot of our production is done in-house, whereas two years ago everything had to be done outside. Back then, the only thing that was live art was the type; we'd indicate the positions for photographs, patterns, and artwork, which would have to be rebuilt on a Scitex or other prepress system." Now, in some cases an entire

file can be built on the Macintosh and sent directly to a prepress service bureau for color separation. "There's a lot of skepticism about prepress," says Kubly. "Is it viable? In my opinion it is. What's exciting about prepress is that we have a lot of control. You can position a scanned image exactly where you want it, and rather than redoing it, someone is taking the actual image that you've built and using that image as the finished product. The Scitex operators will still fine-tune the image and add things like traps and spreads—things I don't think any design firm really cares to tackle."

Cornerstone

In an effort to coax more package-design firms into using its prepress systems, the Creative Systems division of Scitex has introduced the Scitex Cornerstone Design System. Cornerstone provides a collection of hardware and software—a package, if you will—for package designers. The basic hardware system includes a Macintosh IIfx with a 24-bit color board, a 19-inch monitor, a 160-megabyte internal drive and a 40MB removable-cartridge drive, a high-speed modem, and optional hardware such as a scanner or color printer. Cornerstone software includes Illustrator 88, Photoshop, QuarkXPress, MicroPhone II, MarkUp, StuffIt, and DiskTop. These applications reside in a SuperCard-based interface that design firms can configure to suit their particular needs. For example, a firm might use FreeHand in addition to Illustrator 88; FreeHand can be added to the Graphics section of Cornerstone and accessed from there. Or if a firm uses Aldus PageMaker instead of QuarkXPress, PageMaker can be placed in the Layout section in lieu of QuarkXPress.

So far, Cornerstone sounds like simply a way to consolidate programs that you could buy off the shelf. But Cornerstone is more than just a set of hardware components and canned applications. For one thing, Cornerstone includes training and support from Scitex, both in Macintosh basics and package-design specifics. For an-



3 CAD FILE CONVERSION

At this point, Becker would normally make a comp using a piece of cardboard cut into approximately the dimensions of the package. With Cornerstone, he used MicroPhone II and a modem to phone Lasercomb and download the CAD file that will be used to make the die for the actual package. A Cornerstone utility then converted the CAD file—complete with dimensions—to an Illustrator 88 file. This produced not only an accurate comp, but a file that could be sent to film via a Scitex service bureau for the final package artwork as well.

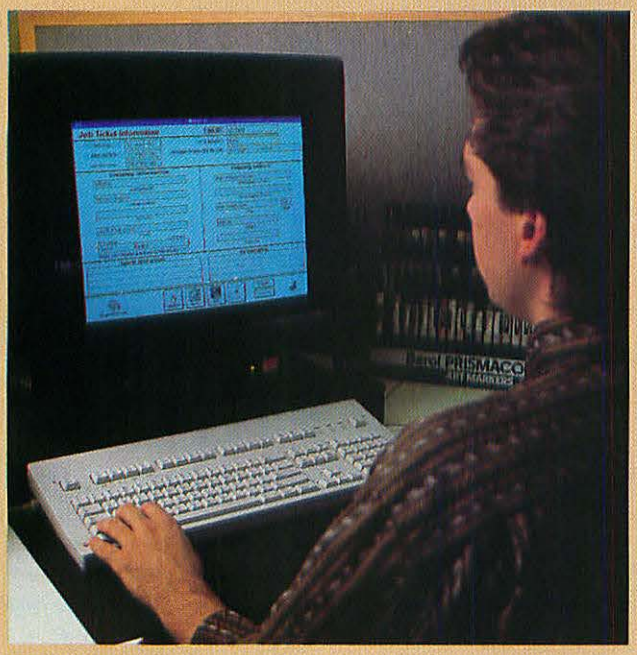
4 ASSEMBLING THE ELEMENTS

The logo, background pattern, cake border, and *San Francisco* signature were then combined with the Illustrator version of the CAD file (with dimension notation removed) in a QuarkXPress document. At this point, the designer typed the product name and ingredients information in QuarkXPress and adjusted the type as necessary, fine-tuning aspects such as size, justification, and tracking.

PIERRE-YVES GOAVEC

5 3-D COMPS: DIGITAL AND CARDBOARD

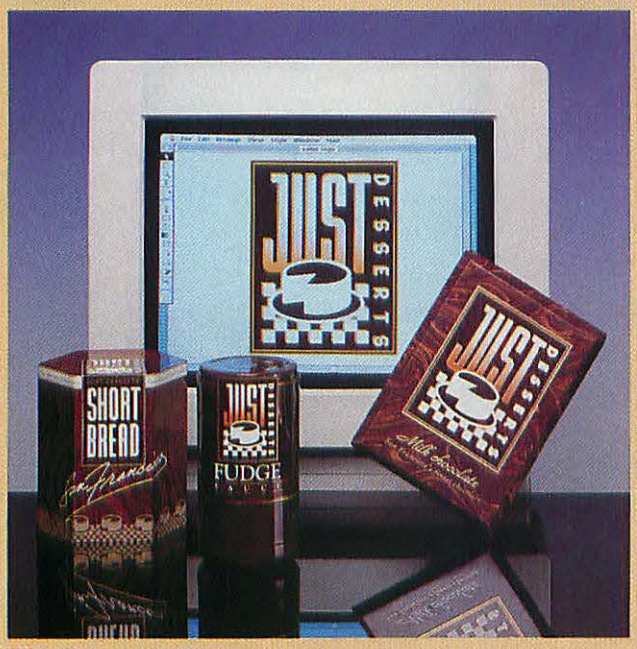
Now with the basic design completed, Becker prepared a 3-D comp to show to other members of the design team. He printed the QuarkXPress document on a QMS ColorScript printer and affixed it to a cardboard backing. He then cut along the CAD file's outline and scored and folded the box. Because the design team might want to make revisions, he also created a 3-D file on the Mac's screen with Swivel 3D. Having a live file on the Mac allowed the designers to experiment with a 3-D design without making numerous cardboard comps.



DRAKE SOREY

6 JOB TRACKING

In addition to incorporating hardware, and graphics, CAD, and page-layout software, Cornerstone allows designers to keep track of the hours spent on each job—a handy feature for internal records and client billing. Once Becker had entered the initial information for the Just Desserts job, for instance, he simply had to press an on-screen button each time he opened the file for the job.



PIERRE-YVES GOAVEC

7 LINE EXTENSION

Having a package's design elements in digital format can simplify the designer's job when a product line is extended. For example, it's easy to alter colors, resize a logo or graphic element, or change copy. Here, the designer has experimented with designs for a variety of containers, including the original shortbread box (with text and background colors changed for different types of cake), a jar for chocolate syrup, and a candy bar wrapper.

other, Cornerstone provides a job-tracking module that automatically logs the hours spent on each project.

But perhaps the most impressive aspect of Cornerstone is its link to computer-aided design (CAD) files produced by Lasercomb, a popular CAD system for package design. Traditionally, a designer works with a hand-drawn mechanical. According to Cornerstone product manager Vera Kark, "Often the die that has been drawn by the mechanical artist doesn't match the die that's physically cutting out the box in the printing process. If it's off by enough, the printing has to be stopped—and when you stop a line, you're talking about a lot of money." With Cornerstone's link to a CAD file created at Lasercomb, however, the designer can work with the same file that will later be sent to the printer, avoiding any errors in measurement. Says Kark, "One advantage of an electronic system is that the designer never has to reink a die; when the die information is sent electronically from a CAD system, the chance of error is significantly reduced." As a bonus, the designer can create comprehensives (also called comps) with the exact dimensions of the final package, instead of the rough comps that are often produced for in-house meetings and presentations to clients.

A Packaging Project

Cornerstone appealed to the designers at Primo Angeli. They were already using Macs and most of the software included with the Cornerstone package; integrating the system into their everyday activities proved to be little trouble. To test the system, Primo Angeli Inc. agreed to create a package using a prerelease version of Cornerstone (it should be available to the pub- lic this fall). The package chosen for the test was a box for shortcake from Just Desserts, a bakery that has contributed heavily to the caloric consumption of the citizens of San Francisco. The project would put Cornerstone through its paces, since it would involve combining elements from several of Cornerstone's applications into

a complex package shape. Key steps in the design and production phases are illustrated in the following pages.

Primo Angeli Inc. had already designed a logo and several packages for Just Desserts, but the bakery wanted to revamp its image with new packaging. Designers Ray Honda and Philippe Becker worked on the redesign, creating a new logo and a new look.

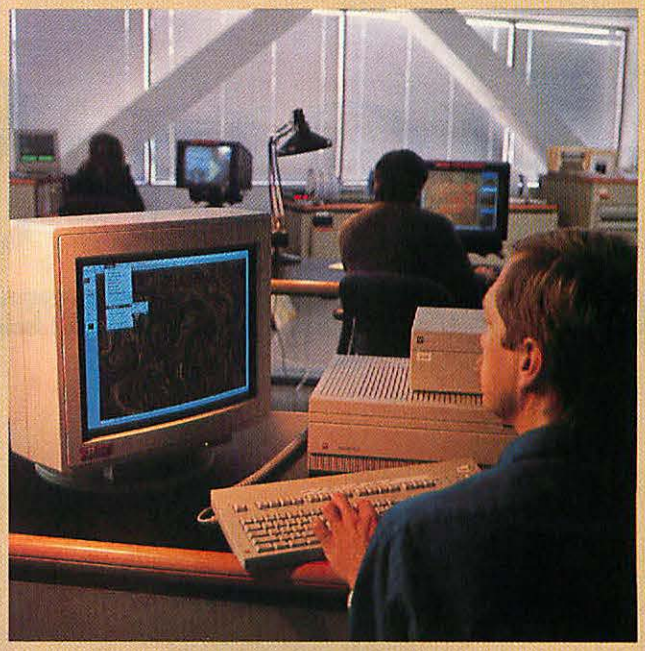
According to Angeli, "Our first design for Just Desserts gave the sense and feel of a kitchen. As they got a bit more sophisticated, they approached us about updating the package. We decided to concentrate on what they were offering: how a cake would look, smell, and taste. We wanted to portray a visual aroma."

Of course, the Mac hasn't completely replaced traditional design methods at Primo Angeli. Despite the availability of 3-D graphics software, designers still make cardboard-backed comps to show to clients. In some cases, old methods are combined with new technology. For example, the *San Francisco* signature for the Just Desserts box was hand drawn to get a fluid, calligraphic look that's impossible to achieve on the Mac. The signature was then scanned, traced with Streamline, and touched up with Illustrator 88 before being placed in a QuarkXPress file. But in other cases, the Mac has entirely supplanted older technology. Kubly remembers the days not so long ago when fixing one letter in a block of type would cost $40 to $60 and several hours, since it had to be sent out to a typesetter. Now, a typo can be fixed in seconds on the Mac's screen.

"I'm afraid of being left behind," says Angeli. "In the design world you've got to be right where it's happening. You have to table your reservations, force yourself to let go of that last rung and try something else." M

See *Where to Buy* for contact information.

***Erfert Fenton** is a* Macworld *contributing editor who specializes in Macintosh graphics and typography.*



DRAKE SOREY

8 COLOR SEPARATIONS VIA SCITEX

At Star Graphics, a Scitex service bureau, the QuarkXPress file (in PostScript format) is converted to Scitex linework format via the Visionary Gateway with VIP, Scitex's Adobe-licensed PostScript interpreter. Scitex autotrapping software reads the file and calculates trapping for adjoining colors. The file is then sent to a Raystar II/S high-resolution plotter, which creates film negatives for four-color separations. The continuous-tone background pattern can either be included with the Mac PostScript file or be input with a high-resolution scanner at the Scitex bureau and be combined with the linework art at an assembler station.

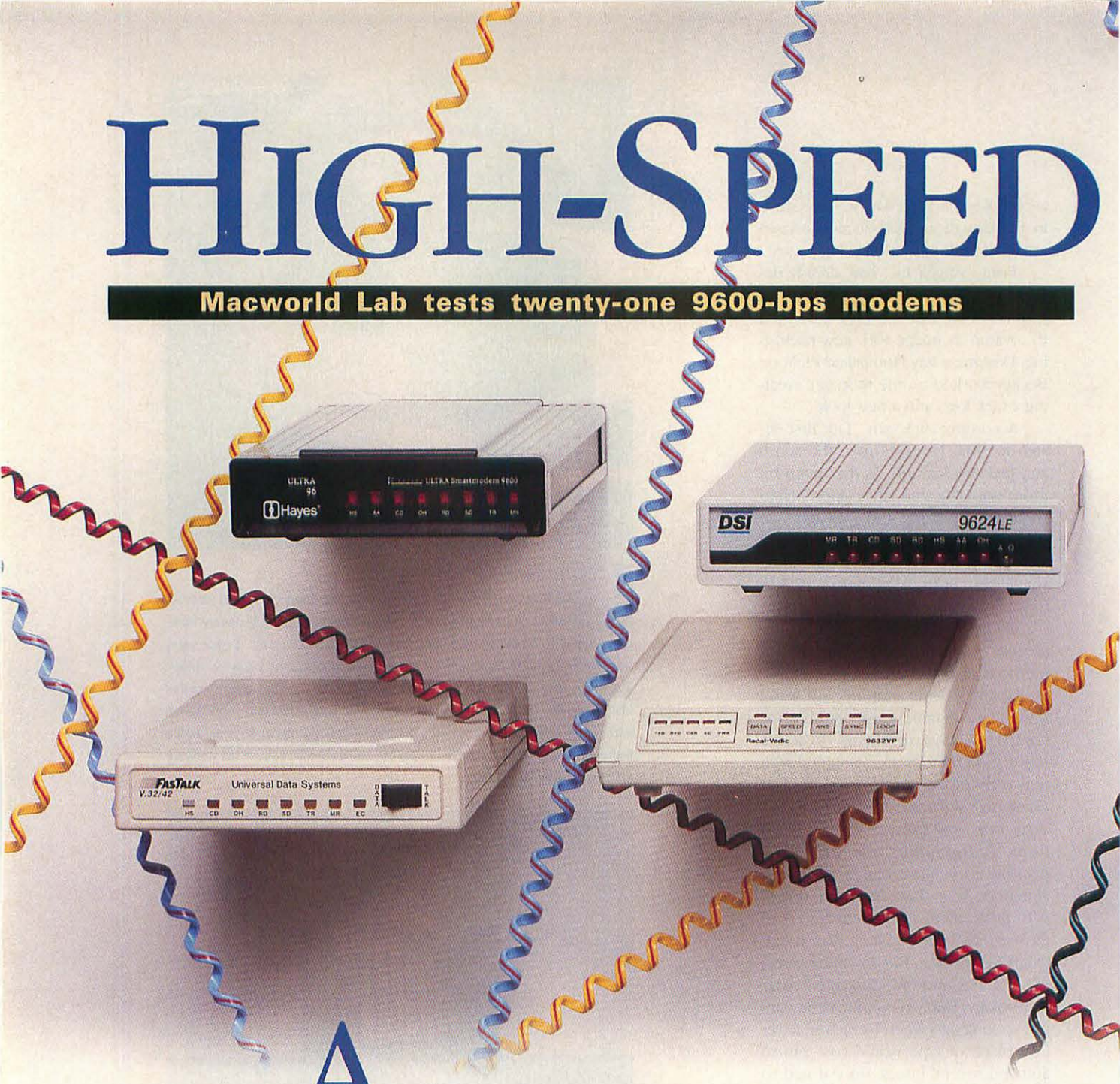
PIERRE-YVES GOAVEC

9 THE FINISHED LOOK

A *hero comp,* a mock-up that looks as good as the real thing, is prepared for the client. For this comp, the QuarkXPress file was printed on an IRIS proofer at Star Graphics, then affixed to cardboard, cut, scored, and folded. Such comps are often used not only for presentations to the client, but are photographed for advertisements or promotional materials as well.

HIGH-SPEED

Macworld Lab tests twenty-one 9600-bps modems



As the importance of telecommunications increases for personal and business use, so does the need for modem speed. The 300-bits-per-second (bps) transfer rate of ten years ago certainly isn't fast enough for today. Even the 2400-bps rate typical of current modems seems a little creaky sometimes.

Fortunately, 9600-bps modems—those high-speed accoutrements that previously were available only to the well-heeled Mac user—are starting to drop to prices below the $1000 mark, putting them more in reach of Macintosh users everywhere. And thanks to now-established modem standards, you no longer need to be a telecommunications wizard to take advantage of the high speeds.

Macworld Lab tested 21 available 9600-bps modems for the Mac (see "Ready to Transmit"). These 21 modems are not the only V.32, 9600-bps modems out in the Macintosh market, but rather a selection of those available at the time the article was being written.

The modems range in price from a low of $795—the Digicom Systems 9624 LE—to a high of $1695—the Codex Model 2264. In addition to price, 9600-bps modems can also differ in functionality. The $995 Prometheus ProModem 9600 can function as both a 9600-bps data modem and a 4800-bps fax modem. The $1979 Shiva NetModem V.32 is a special case; in addition to functioning as a regular V.32 9600-bps modem, it can

MODEMS

by Dave Kosiur

also act as a half-bridge for AppleTalk networks and support dial-in access by remote users to the network, something the other modems aren't capable of doing.

Standard Issue

When I last wrote about 9600-bps modems (see "Communicating at Speed," *Macworld,* July 1989), I remarked that while the debate over high-speed modem standardization was still going on, it was headed toward resolution. A year and a half later, I'm happy to say the standards are settled. All high-speed modem manufacturers now support the International Consultative Committee for Telegraph and Telephone (CCITT) V.32 modulation standard for 9600-bps communication. Indeed, every modem tested by Macworld Lab supports V.32.

V.32 essentially specifies how two modems communicate over telephone lines, as well as how those modems encode and decode the data passing between them. For a modem to support V.32, it must operate in *full-duplex* mode over a pair of phone wires. In other words, it can send and receive data simultaneously. (In contrast, *half-duplex* modems can do only one thing at a time; they either send or receive data at a given instant.) Many earlier 9600-bps modems weren't true full-duplex modems, but half-duplex modems that simulated full-duplex modems. Implementation differences in these asymmetrical and ping-pong

PHOTOGRAPHS BY PAUL BERG

Pictured on the previous page are (clockwise from upper left-hand corner) the Hayes V-Series Ultra Smartmodem 9600, Digicom Systems 9624 LE, Prometheus Products ProModem 9600, Universal Data Systems V.3225, NEC America N9631, Racal-Vadic 9632VP, and Universal Data Systems FasTalk V.32/V.42 .

modems caused compatibility problems with 9600-bps modems.

Due to inherent physical limitations, full-duplex operation at 9600 bps is normally impossible over ordinary phone lines. But using a technique called *echo cancellation,* one modem can filter its own tones from the phone line, thus enabling it to pick out incoming signals from another modem. (Remember, both transmitted and received signals exist simultaneously on the phone line in full-duplex mode.) However, echo cancellation requires that high-speed modems include built-in digital signal processor (DSP) chips. Those chips are one reason why 9600-bps modems cost more than 1200-bps or 2400-bps modems.

The V.32 standard also provides an optional error-reduction scheme, called *trellis-coded modulation* (TCM). TCM allows 9600-bps modems to check for transmission errors with a redundancy bit. As a result, modem transmissions using TCM are less vulnerable to data errors caused by poor line conditions. All of the 9600-bps modems we tested offer TCM error reduction. Some modems, however, do not. Because the V.32 standard specifies that 9600-bps modems offering TCM must be able to work automatically with non-TCM 9600-bps modems, whether a modem has or doesn't have TCM won't affect compatibility.

Also defined under the V.32 standard is a *fallback* mode of 4800 bps, to be used when telephone-line conditions aren't good enough for 9600-bps transmissions. In addition, all 9600-bps modem manufacturers provide support for lower-speed transmissions with V.32 modems. As a result, you can also use V.32 modems to connect to slower modems, such as those that only run at 1200 bps or 2400 bps.

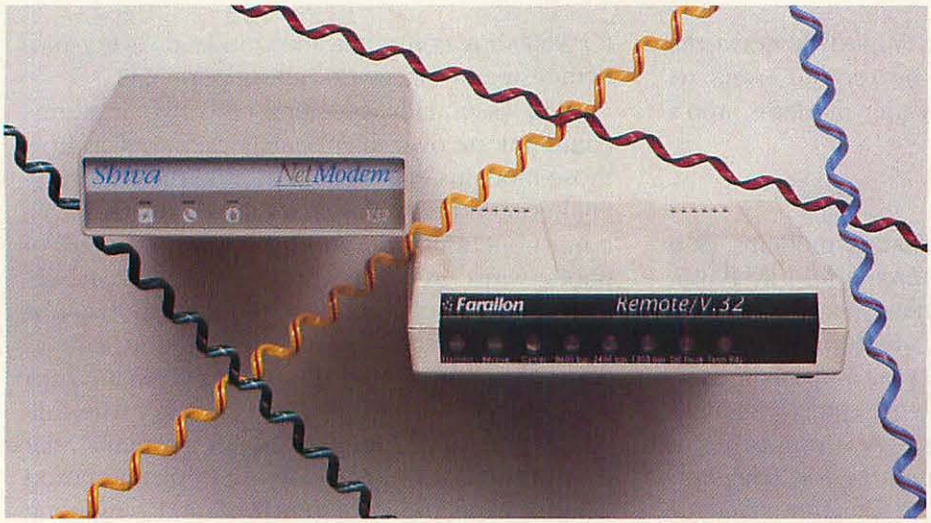
Error Correction and Data Compression

The V.32 modulation standard is not the only standard for 9600-bps communications. Other recently established standards are aimed at even faster and more error-free communications with high-speed modems.

In contrast to TCM, which reduces errors during signal modulation, V.42 is the CCITT error-correction standard for detecting and correcting data-transmission errors. The CCITT chose to include two different error-correction protocols in V.42. A method of error-correction commonly implemented in 9600-bps modems uses Classes 2, 3, and 4 of Microcom's proprietary Microcom Networking Protocol (MNP). (MNP protocols are divided into classes according to functionality. Classes 2, 3, and 4 handle error correction.) Of the 21 modems Macworld Lab tested, only Shiva's NetModem V.32 didn't support MNP error-correction and data-compression protocols.

While MNP was added to the V.42 specification—because of the large number of MNP-based modems available—MNP is not the preferred error-correction scheme of the CCITT. That group prefers a protocol called Link Access Protocol-Modem (LAP-M). Of the modems we tested, only one offers LAP-M support: the Hayes V-Series Ultra Smartmodem 9600.

Modems that only offer MNP error correction are called V.42-compatible. Modems that support both MNP and LAP-M, like the Hayes V-Series Ultra Smartmodem 9600, are called V.42-compliant. During *handshaking*, which is the signaling two modems perform to establish a carrier, a V.42-compliant modem will try first to establish a LAP-M error-control connection with a V.42-compatible modem. Because the V.42-compatible modem won't recognize LAP-M, the V.42-compliant modem will automatically try MNP error control. However, most modem manufacturers do plan on implementing LAP-M error correction in their modems; you should talk to a manufacturer about its V.42 upgrade policy if you want a V.42-compliant modem in the future.



Although they cost more, Farallon's Remote/V.32 Modem and Shiva's NetModem V.32 offer a bit more function—via bundled software and built-in hardware—than other modems. Prometheus Products' ProModem 9600 (not pictured here) can send data at 9600 bps and send and receive faxes at 4800 bps.

Having a V.42-compliant modem is important not for its error-correction capabilities, but for its data-compression capabilities. V.42bis is a new CCITT standard for data-compression techniques. To support V.42bis, 9600-bps modems must employ LAP-M.

Of the modems tested by Macworld Lab, only the Hayes V-Series Ultra Smartmodem 9600 offers V.42bis. All the other modems—except the Shiva NetModem V.32—support MNP Class 5 data compression. What are the differences between the two techniques? MNP Class 5 isn't

QUALITY COUNTS

When you make a phone call—modem or voice—you never know which phone circuit that call will get routed through. In fact, if you make two calls within five minutes to an identical number, you'll probably get two different circuits. And the quality of those two circuits might differ. That inconsistency in line quality (and your inability to control it) makes testing modems over lines of varying line quality important. At the same time, it makes that type of testing difficult. Macworld Labs can't control line quality any better than you can.

To deal with that problem, we performed the tests in-house with a telephone-central-office simulator, following testing specifications originally published by AT&T in 1984. The specifications are designed to cover the range of line quality likely to be found in the world's telephone systems. AT&T defines four different connection types: perfect, average long-distance, tough long-distance, and worst-case long-distance.

AT&T estimates that the average long-distance category corresponds to lines used by 50 percent of all long-distance calls. Half of the remaining calls (25 percent of all calls) are completed over tough long-distance lines. Another 15 percent of all calls occur over the worst-case long-distance lines. The remaining 10 percent of all calls border on hopeless—the call might make it through, then again it might not. Yes, it's true: there's no such thing as a perfect line when you make a phone call.

Several technical factors characterize the differences between the four types of long-distance connections. The first factor is short-term change in the amplitude, or strength, of the modem signal. These amplitude changes, or *gain hits* as they're called, can introduce an unwanted modulation of the carrier wave and confuse the modem. The second factor is *frequency shift,* more common in analog phone circuits than digital ones. Frequency shifts can distort the modem's modulation scheme and cause errors in received data, requiring a retry transmission. *White noise,* or hiss, on the line is the third factor; white noise makes it more difficult for a modem to determine what's a real signal from another modem and what's not. Finally, *phase jitter,* the fourth factor, causes small variations in the delay of a signal across the line. Because it can occur at the same frequency 9600-bps modems use to transmit data, phase jitter can lead to errors in the transmission.

a CCITT standard; V.42bis is. In addition, MNP Class 5 offers a maximum compression factor of two. V.42bis provides a maximum compression factor of four.

Using the V.42bis data-compression standard, 9600-bps modems can reach data-transmission speeds of up to 38,400 bps. The handshaking routine for V.42 also applies to V.42bis: a modem first tries with V.42bis, then goes to the MNP Class 5 alternative, then if necessary goes to no compression. As a result, you won't run into any compatibility problems between modems that support V.42bis and others that only offer MNP Class 5. Modems are only now starting to employ V.42bis, and you should contact manufacturers about the possibility of upgrading.

Test Trio

To get a better idea of how the 9600-bps modems perform all around, Macworld Lab ran three different types of tests. In all tests, TCM was turned on. Where possible, we also enabled a feature that allows a modem to *autoretrain* its connection with another modem in case of excessive errors. The 4800-bps fallback V.32 feature was disabled in all cases.

We then compared a particular modem's test results with that modem's baseline transfer rate. The baseline transfer rate was established by determining the modem's best possible throughput under the best line conditions.

Down and Dirty The first group, low-level tests, determined how well each modem functioned over phone lines of varying quality. To accomplish this, Macworld Lab used an electronic device, called a telephone-central-office simulator, to simulate a phone-line connection between a pair of identical modems (see "Quality Counts").

Once the modem connection was established over a "line" of predetermined quality, we sent random data over that connection for two minutes. Test software then reported the number of characters successfully sent from one modem to the other during that two-minute interval.

Data Compression Macworld Lab also tested how well each modem implements the MNP Class 5 data-compression protocol. We chose MNP Class 5 because most of the 9600-bps modems offer it.

To test MNP Class 5, we sent two different sets of characters through the modem. The first was a set of random characters. In the case of the random sequence, we expected to see very little data compression, as there would be very few repeatable bit patterns for the data-compression algorithm to recognize. The second set was a repeated sequence of characters. We believed that transmissions with the repeated sequence would exhibit nearly the maximum possible data compression, which, in the case of MNP Class 5, is a factor of two.

MACWORLD MW LAB

LOW-LEVEL TEST RESULTS

(in characters per second)

- Excellent
- Good
- Fair
- Poor
- Unacceptable

Results from low-level tests performed by Macworld Lab illustrate just how much the quality of telephone lines can affect modem data-transfer rates. We weren't surprised to see some minor differences in transfer rates between modems. What did surprise us was that there were some modems that had considerably lower transfer rates over lines with tough loads, not to mention average loads. In particular, the FastComm FDX 9696 (and the E-Tech Bulletmodem E9696M, to a lesser extent) had problems performing on lines of average quality. Performance of the Microcom QX/3296c (and Telenetics TC96/V.32, to a lesser extent) deteriorated on tough-quality lines. None of the modems were able to maintain high transfer rates under the worst-case load.

	Average Load	Tough Load	Worst Load
Anderson Jacobson 9632-STH	956	956	0
Codex Model 2264	956	946	33
Digicom 9624 LE	956	956	65
E-Tech Bulletmodem E9696M	787	675	0
Farallon Remote/V.32 Modem	956	956	283
FastComm FDX 9696	471	190	0
General DataComm DeskTop 596 Modem	944	954	0
Hayes V-Series Ultra Smartmodem 9600	956	956	0
Microcom QX/3296c	945	10	0
Multi-Tech MultiModem V32	953	942	5
NEC N9631	956	954	152
Prometheus ProModem 9600	956	955	52
Racal-Milgo RMD 3221	946	950	0
Racal-Milgo RMD 3222	956	956	300
Racal Vadic 9632VP	926	946	0
Shiva NetModem V.32	975	968	0
Telebit T2500	956	949	0
Telenetics TC96/V.32	946	477	0
UDS FasTalk V.32/V.42	956	953	274
UDS V.3225	956	943	127
U.S Robotics Courier V.32	956	956	10

DATA-COMPRESSION TEST RESULTS

(in characters per second)

Macworld Lab's data-compression tests indicate definite differences in how vendors implement MNP Class 5 data compression in their modems. And, as we expected, all modems had greater success compressing the organized character data than the random character data. However, most of the modems that performed well in the organized data test maintained data-transfer rates of the random data near the baseline. In other words, implementations of MNP Class 5 in those modems didn't expand the random data file unnecessarily during compression.

[1] Unable to perform test.
[2] MNP Class 5 not offered on NetModem.

	Organized Class	Random Class
Anderson Jacobson 9632-STH	1910	1001
Codex Model 2264	1862	910
Digicom 9624 LE	1889	989
E-Tech Bulletmodem E9696M[1]	—	—
Farallon Remote/V.32 Modem	1401	850
FastComm FDX 9696	1110	522
General DataComm DeskTop 596 Modem	1904	918
Hayes V-Series Ultra Smartmodem 9600	1887	1122
Microcom QX/3298c	1112	495
Multi-Tech MultiModem V32	1108	648
NEC N9631	1907	983
Prometheus ProModem 9600	1843	985
Racal-Milgo RMD 3221[1]	—	—
Racal-Milgo RMD 3222	1748	810
Racal-Vadic 9632VP	1864	764
Shiva NetModem V.32[2]	—	—
Telebit T2500	1907	1068
Telenetics TC96/V.32	1850	876
UDS FasTalk V.32/42	1860	816
UDS V.3225	1910	992
U.S. Robotics Courier V.32	1479	744

READY TO TRANSMIT

Company	Model	Speed (in bps)	Modulation Standards	V.42 Error Correction	Data Compression	Price
Anderson Jacobson	9632-STH	300–9600	Bell 212A, V.21, V.22, V.22bis, V.32	MNP	MNP	$1085
Codex Corporation	Model 2264	1200–9600	Bell 212, V.22, V.22 bis, V.32	MNP	MNP	$1695
Digicom Systems	9624 LE	1200–9600	Bell 212A, V.22, V.22bis, V.32	MNP	MNP	$795
E-Tech Research	Bulletmodem E9696M	300–9600	Bell 212A, V.21, V.22, V.22bis, V.23, V.32	MNP	MNP	$1095
Farallon Computing	Remote/V.32 Modem	300–9600	Bell 103, Bell 212, V.22, V.22bis, V.32	MNP	MNP	$1295[1]
Fastcomm Communications Corporation	FDX 9696	300–9600	Bell 103, Bell 212A, V.21, V.22bis, V.32	MNP	MNP	$999
General DataComm	DeskTop 596 Modem	300–9600	Bell 103, Bell 212A, V.21, V.22bis, V.32, V.42	MNP	MNP	$995
Hayes Microcomputer Products	V-Series Ultra Smartmodem 9600	300–9600	Bell 103, Bell 212A, V.22, V.21, V.22bis, V.23, V.32	MNP, LAP-M	MNP, V.42bis, proprietary	$1199
Microcom	QX/3296c	300–9600	Bell 103, Bell 212, V.22, V.22bis, V.32	MNP	MNP	$1199
Multi-Tech Systems	MultiModem V32	300–9600	Bell 103, Bell 212, V.22, V.22bis, V.32	MNP	MNP	$1099
NEC America	N9631	300–9600	Bell 103, Bell 212A, V.22, V.22bis, V.32	MNP	MNP	$1095
Prometheus Products	ProModem 9600	1200–9600	Bell 103, Bell 212A, V.22, V.22bis, V.32	MNP	MNP	$995
Racal-Milgo	RMD 3221	300–9600	Bell 103, Bell 212A, V.22, V.22bis, V.32	MNP	MNP	$1095
Racal-Milgo	RMD 3222	300–9600	Bell 103, Bell 212A, V.22bis, V.32	MNP	MNP	$1595
Racal-Vadic	9632VP	300–9600	Bell 103, Bell 212A, V.22bis, V.32	MNP	MNP	$1095
Shiva Corporation	NetModem V.32	300–9600	Bell 103, Bell 212A, V.22, V.22bis, V.32	none	none	$1979
Telebit Corporation	T2500	300–19,200	Bell 103, Bell 212A, V.22, V.23, V.22bis, V.32, proprietary	MNP, PEP	MNP, proprietary	$1345
Telenetics Corporation	TC96/V.32	300–9600	Bell 212, V.22, V.22bis, V.32	MNP	MNP	$895
UDS	FasTalk V.32/V.42	300–9600	Bell 103, V.22, V.22bis, V.32, V.42	MNP	MNP	$995
UDS	V.3225	300–9600	Bell 103, Bell 212, V.22, V.22bis, V.32	MNP	MNP	$1145
U.S. Robotics	Courier V.32	300–9600	Bell 103, Bell 212A, V.22, V.22bis, V.32	MNP	MNP	$995

[1]Includes Timbuktu/Remote and Remote/Wakeup Cable.

Network File Transfers One increasingly popular way of using 9600-bps modems is as a link between two geographically separate AppleTalk networks. We tested how well modems operate under such conditions by connecting a Shiva TeleBridge (a half-bridge) to each of two networks. A pair of identical modems were attached to the TeleBridges (one modem per TeleBridge). Because the Shiva NetModem V.32 attaches directly to a LocalTalk network and functions on its own as a half-bridge, we didn't need to use a TeleBridge to test the NetModem V.32.

Using Xon/Xoff flow control with MNP data compression enabled (where available), we then transferred three files from an AppleShare server on one network to a Mac on another network: a 166,400-byte (163K on disk) FileMaker II database file, a 196,632-byte (193K on disk) Excel spreadsheet file, and a 196,714-byte (193K on disk) text file. Each file transfer was timed to determine the speed of data transmission.

How They Stack Up

Based on the low-level tests, we found that most of the modems performed about the same under the average and tough-case loads (see "Low-Level Test Results"). In fact, except for four models, the modems varied less than 4 percent from their respective baseline data-transfer rates. Those four exceptions were the E-Tech Research Bulletmodem E9696M, Fastcomm FDX 9696, Microcom QX/3298c, and the Telenetics TC96/V.32. They exhibited slower transfer speeds (2 to 95 times slower) under the tough load tests. One modem, Fastcomm's FDX 9696, even had problems with the average load test, running about 2 times slower than the average.

When it came to the worst-case load, all modems had difficulty performing data transfers. Half of the modems failed completely under the worst-case test conditions; the remaining half did no better than a transfer rate one-third that of their rate under an average load. Our conclusion? Don't expect any of these modems to perform well with a very noisy connection.

More differences between modems showed up in our MNP data-compression tests. Just over half (13 of the 21) of the modems showed data-compression factors near the theoretical maximum of two (see "Data-Compression Test Results"). We were unable to make a connection using MNP data compression—and therefore unable to run the data-compression test—with two modems, E-Tech's Bulletmodem E9696M and Racal-Milgo's RMD 3221, despite technical support calls to E-Tech and Racal-Milgo.

NETWORK TRANSFER TEST RESULTS

(in characters per second)

MACWORLD MW LAB

Excellent
Good
Fair
Poor
Unacceptable

In Macworld Lab's network transfer tests, the best modems were those that offered an average transfer rate for all three file types (database, spreadsheet, and text) above their respective baseline transfer rate. However, a strict tallying of transfer rates doesn't tell the entire story of a modem's performance in the tests. Consistency in transfer rates can be as important—even more so since most users transfer a wide variety of file types. Some modems transferred one particular file type over 300 characters per second slower than another file type.

	Database Transfer	Spreadsheet	Text	Average
Anderson Jacobson 9632-STH	1156	1124	1237	1172
Codex Model 2264	864	1124	888	959
Digicom 9624 LE	1008	752	1105	955
E-Tech Bulletmodem E9696M	1152	1177	1237	1189
Farallon Remote/V.32 Modem	1060	998	1118	1059
FastComm FDX 9696	1021	833	1118	991
General DataComm DeskTop 596 Modem	1067	917	1124	1036
Hayes V-Series Ultra Smartmodem 9600	1265	1311	1361	1313
Microcom QX/3296c	1060	673	1237	990
Multi-Tech MultiModem V32	1132	1063	1253	1149
NEC N9631	1132	1127	1211	1156
Prometheus ProModem 9600	810	506	900	739
Racal-Milgo RMD 3221	515	1024	1081	873
Racal-Milgo RMD 3222	849	723	996	856
Racal Vadic 9632VP	1084	1049	1124	1086
Shiva NetModem V.32	820	826	828	825
Telebit T2500	1206	1338	1245	1263
Telenetics TC96/V.32	1018	837	1118	991
UDS FasTalk V.32/V.42	897	896	892	895
UDS V.3225	1128	1130	1211	1156
U.S. Robotics Courier V.32	796	799	803	799

ASK SOME QUESTIONS, GET SOME STRANGE ANSWERS

You say you don't need technical support? Don't even send in your registration cards? Think again.

Despite the fact that V.32 solves problems with modulation incompatibilities, high-speed data communications can still be a tricky prospect. Things like flow control, fallback speed, even cabling can affect how your modem connection works—or doesn't work. As a result, you may find yourself dialing your modem manufacturer's technical support line just to get started with 9600-bps modems.

To evaluate the quality of modem technical support, Macworld Labs anonymously called several modem manufacturers with a specific problem about high-speed Mac binary file transfers. Such high-speed data transfers often necessitate some type of hardware flow control, which is affected by the cable connecting the Mac and modem. With the Macintosh's unique 8-pin, nonstandard RS-232 modem port, problems with hardware flow control will stump anyone who doesn't know the Mac.

The disparity between Mac-knowledgeable and non-Mac-knowledgeable companies was clear. For example, Farallon Computing solved the problem in less than a minute; Prometheus Products and U.S. Robotics did so in less than four minutes. Hayes also gave us the solution—even providing us with the correct cable pinouts—in a few minutes.

The responses of companies not so well acquainted with the Mac ranged from just short of the mark to comic. Tech-support personnel from some companies suggested we use everything from lower transmission speeds to different levels of MNP to transfer the file; other tech-support personnel blamed our problem on error-control protocols or incorrect AT commands. One vendor tried hard, though unsuccessfully, to solve the problem—the support person even pulled out his technical reference for the Mac modem port. Ultimately, he advised our entire company to switch software and buy IBM PCs.

Our conclusion? Finding a high-speed modem vendor that understands the Mac (and a vendor who you can understand) can be a challenge. Although the quality of vendor technical support shouldn't be the only thing you consider when buying a 9600-bps modem, it's not something to ignore either. Good vendor technical support may be the only thing that prevents you from pulling your hair out in frustration when setting up or troubleshooting a high-speed modem.—*Tim Warner*

It's worth noting that—as we expected—the MNP Class 5 data compression did not improve the transmission speed of the random character data. In fact, MNP Class 5 actually increased the number of characters sent, reducing transmission speed.

Most modems that exhibited good MNP-5 peformance for the repeated-character data also expanded the random-data file the least. That is what you would want in a good modem. The one notable exception to this rule was the Universal Data System (UDS) FasTalk V.32/V.42, which expanded the random-data file by more than 10 percent.

Interestingly enough, Macworld Lab found no correlation between the price of the modem and its performance in either the low-level or data-compression tests.

In our network tests, we had no problem with any modems transferring files between the two networks. But we did notice that some 9600-bps modems did not transfer the three different files equally well (see "Network Transfer Test Results"). Modems that had the most consistent file-transfer rates were the E-Tech Bulletmodem E9696M, NEC's N9631, Racal-Vadic's 9632VP, Shiva's NetModem V.32, the FasTalk V.32/V.42 and V.3225 from UDA, and U.S. Robotics' Courier V.32.

However, the most consistent modems weren't necessarily the fastest. In fact, only three modems—E-Tech's Bulletmodem E9696M, NEC's N9631, and UDS's V.3225—garnered an excellent rating for both consistency and speed. Other 9600-bps modems that ranked equally high in speed were Anderson-Jacobson's 9632-STH, Hayes's V-Series Ultra Smartmodem 9600, Multi-Tech Systems' MultiModem V32, and Telebit's T2500. These modems were able to compress the data files somewhat, reaching average data-transfer rates greater than 120 percent of their respective baselines.

Another observation we made was that some 9600-bps modems did not work as well with Xon/Xoff flow control turned off as when flow control was on. The modems affected by the use of flow control were: the Fastcomm FDX 9696, Microcom QX/3296c, Prometheus ProModem 9600, Racal-Milgo RMD 3221, Racal-Vadic 9632VP, and Telenetics TC96/V.32. As a result, we recommend enabling Xon/Xoff flow control in any high-speed modem when using the TeleBridge.

Cranking Up the Speed

Our tests revealed that several V.32 9600-bps modems provide excellent all-around performance. With 2400-bps modems selling for between $200 and $300, prices of 9600-bps modems should be about four times that of 2400-bps modems for a similar price-to-performance ratio.

Five 9600-bps V.32 modems fit that criteria for price—under $1200—and performed above average in every test (except the worst-line low-level test, because no modem did well on it). Macworld Lab recommends as general-purpose, high-speed modems the Anderson Jacobson 9632-STH, Hayes V-Series Ultra Smartmodem 9600, NEC N9631, Racal-Vadic 9632VP, and UDS V.3225. The only reason we cannot recommend the Telebit T2500, which also performed above average in every test, is its high price: $1345.

We believe that two other modems deserve consideration despite their price tags. The $1295 Farallon Remote/V.32 Modem performed well on all tests, and includes a copy of Farallon's Timbuktu/Remote software and Farallon's Remote/Wakeup cable. The $1979 Shiva NetModem V.32 isn't really meant to serve as a 9600-bps modem for a single user, but rather as a shared modem for several users on a LocalTalk network. Taking that into account, we recommend it as a cost-effective solution for two or more users on a network, even though its file-transfer performance is hampered by lack of compression.

Other V.32 modems tested performed well on one or two tests, but did poorly on others. Depending on how you plan to use a 9600-bps modem, you may find one of these modems adequate for your needs. The benchmark results allow you to compare how individual modems did on each test.

Now for a more important question: should you even purchase a 9600-bps modem? If you're planning to use it solely for accessing online services such as CompuServe or MCI Mail, don't bother. Not only do many information services not even support 9600-bps connections, but it's unlikely that you will save that much money because of extra 9600-bps connect charges in addition to the cost of a modem.

If you are interested in communicating with someone else who does have a 9600-bps modem, or in tying two networks together, go for the most speed you can get. Thanks to the V.32 standard you do not have to worry any more if the other side of an intended telecommunications session is using the same brand of modem you are. With the advent of V.32, you can mix-and-match 9600-bps modems with much less trepidation than before. M

See *Where to Buy* for contact information.

***Dave Kosiur** is a* Macworld *contributing editor, and the editor and publisher of* Connections, *a newsletter on Macintosh connectivity. The California Highway Patrol would rather see him work with high-speed modems than with high-speed cars in his travels between his Fullerton, California, home base and the* Macworld *offices in San Francisco.*

HALF BOTTLES
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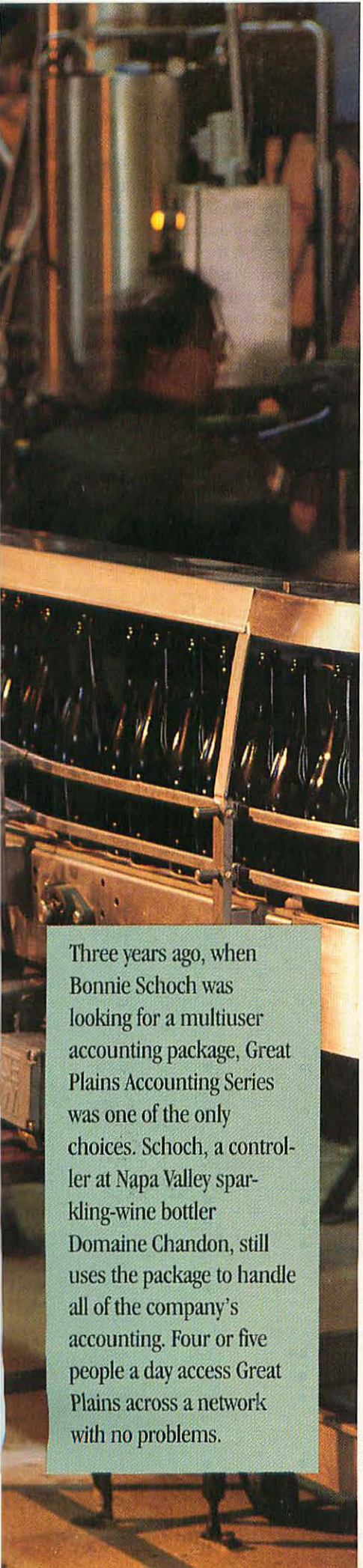


Three years ago, when Bonnie Schoch was looking for a multiuser accounting package, Great Plains Accounting Series was one of the only choices. Schoch, a controller at Napa Valley sparkling-wine bottler Domaine Chandon, still uses the package to handle all of the company's accounting. Four or five people a day access Great Plains across a network with no problems.

KEN PROBST

ACCOUNTING GROWS UP

The year 1990 welcomes more accounting packages and some quality updates to longtime contenders

Unlike Rodney Dangerfield, Macintosh accounting packages are beginning to gain respect. In the past when I mentioned Mac bookkeeping programs to my CPA and number-cruncher friends, I was most often met with knowing smiles, as though Mac financial programs were just one step above Roger Rabbit in respectability and about as professionally acceptable as Cliffs Notes. Lately, however, I have encountered more serious questions—and fewer sardonic smiles—about accounting packages for the Mac. A good deal of this respect is no doubt due to the growing awareness that many quality bookkeeping programs are now available for the Mac. Although I still run into Macskeptics, I'm finding many more financial folks who are genuinely interested in the Mac's accounting capabilities. The big change in this year's overview of accounting programs is the addition of low-end personal finance programs. Because these programs include numerous accounting-type features, they are being used extensively by small businesses for bookkeeping. For instance, Survivor Software's MacMoney has a companion invoicing program; Intuit has added categories for business expenses such as postage and supplies to Quicken's chart of accounts; and Aatrix's CheckWriter II, a program that matches Quicken in price, offers a number of small business features such as automated addressing for payees and a DA that reminds you of payments due. This year also brings a major shift in programs such as SBT's Mac/Series Six Plus and Lake Avenue Software's The Assistant Controller Series. These programs were initially written in dBase for the IBM PC and later moved to FoxBase for the Mac. But the original FoxBase maintained many of the IBM PC conventions, ignoring the Mac interface. FoxBase+/Mac, how-

BY ALAN L. SLAY

ever, has a Mac-like interface and still maintains the speed of the original version. What this means for users is that Mac/Series Six Plus and The Assistant Controller Series now work more like Macintosh programs than like command-line driven IBM PC programs. Another program based on FoxBase+/Mac, Champion Macintosh, does not take advantage of the database's Macintosh features, however. This competent program maintains the same staid interface it uses on the IBM PC.

I also include accounting programs based on Excel. These programs cover a wide range, from simple-to-use (Spreadware's Minimum Requirements) to highly sophisticated (Absolute Solutions' Computerized Classic Accounting). I've also added Database International's Aware, an Omnis 3–based program. (Aware will be upgraded soon to work on the more Mac-like Omnis 5).

A few old friends from years past reappear from different publishers. In-House Accountant (formerly published by Migent) is now published by In-House Software, and Business Sense (formerly published by Monogram) is now published by Inman Software. Otherwise, these programs have not changed. Peachtree has also acquired Layered and its two accounting products, atOnce and the Insight Expert series. At press time, Peachtree had not decided whether the products will retain the Layered name or will be relabeled as Peachtree products. Either way, the products will remain on the market.

ACCOUNTING PROGRAMS COMPARED

	PERSONAL APPLICATIONS				EXCEL-TEMPLATE APPLICATIONS			ONE-WRITE APPLICATIONS	
	CheckWriter II	MacMoney	Managing Your Money	Quicken	Computerized Classic Accounting	Fiscal Knowledge	Minimum Requirements	Insight OneWrite	Plains & Simple One-Write
Company	Aatrix Software	Survivor Software	MECA Software	Intuit	Absolute Solutions	Mathesis	Spreadware	Layered	Great Plains Software
Version	1.0	3.51	3.0	1.5	2.2	1.01	2.02	1.01.01	1.01
Retail price[1]	$59	$119.95	$219.95	$59.95	$395–$995[2]	$219	$59	$129	$395
Requires additional database program	○	○	○	○	●	○	○	○	○
Minimum memory required	1MB	512K	1MB	512K	2MB	1MB	512K	512K	512K
Imports data/exports data	●/●	○/●	○/●	○/●	●/●	●/●	●/●	○/○	○/○
Password protection	●	○	○	○	●	●	●	○	○
Maximum departments or profit centers	NA	NA	lm	NA	ld	ld	15	99	1
Free telephone support (in days)	unlimited	unlimited	unlimited	unlimited	30	unlimited	unlimited	30	0
Toll-free telephone support	○	○	○	○	○	○	○	●	●
Budgeting capability	●	●	●	●	●	●	○	●	○
GENERAL LEDGER									
Maximum # of transactions	ld	6000	lm, ld	ld	lm, ld	ld	lm	ld	ld
Maximum # of bank accounts	ld	250	lm, ld	ld	60	ld	15	1	ld
Chart of accounts									
sample set provided	●	●	●	●	●	●	●	●	●
maximum # of accounts	ld	250	lm	ld	ld	ld	34	58	ld
alpha/numeric	●/●	●/●	●/●	●/●	○/●	●/●	●/○	●/○	○/●
Processing method	r	r	r	r	b	b	r	r	r
Automatic reversals	○	●	●	○	○	○	○	○	●
Direct disbursements (from G/L)	●[4]	●[4]	●[4]	●[4]	●	●	○	○	○
Flexible fiscal periods	○	○	○	○	●	●	●	●	○
Enter future transactions (current year)	●	●	●	●	●	○	●	●	●
Enter prior-period transactions	●	●	○	●	●	●	●	●	●
Recurring entries	●	●	●	●	●	●	○	○	●
Reconcile checking account on screen	●	●	●	●	●	●	○	●	○
Reports									
screen, disk, graphs	s, d, g	s, d, g	s, d, g	s, d	s, d, g[5]	s, d, g[5]	s, d, g[5]	s, d	s
trial balance/balance sheet	○/●	○/●	●/●	○/○	●/●	●/●	●/●	●/●	●/●
income statement	●	●	●	●	●	●	●	●	●
transaction journals	●	●	●	●	●	●	●	●	●
forecasts	○	○	●	○	●	●	○	○	○
ratios and interpretations	○	○	○	○	○	○	○	○	○
custom	○	●	○	●	●	●	●	●	○

● = yes, ○ = no. *a = alpha, b = batch, d = disk, g = graphs, ld = limited by disk space, lm = limited by memory, n = numeric, r = real-time, s = screen.*

[1]Street prices are often lower than the list prices displayed. Some dealer and VAR prices may be higher, however, because they contain additional charges for such services as set-up, installation, training, or customization. [2]Price depends on which modules are purchased. [3]Price per module. [4]You can write checks. [5]Graphs can only be created in Excel. [6]Requires separate module.

Two noteworthy products include Teleware's M.Y.O.B. and Satori Software's Components series. As a low-end accounting program, M.Y.O.B. is geared to small-business users, but because of its low street price, it may also be used as a powerful personal finance program. (At press time, Teleware announced that it was upgrading M.Y.O.B., and changing its distribution. The list price is also changing—to $249—although the street price is expected to remain low—about $145.) Satori's very promising and highly customizable Components series now offers an Accounts Receivable (A/R) module to go with the General Ledger (G/L) released last year.

How to Read the Table

I have divided the text (and the table, "Accounting Programs Compared") into five sections. The first section includes the personal bookkeeping programs, which are aimed at individual users and very small businesses. The second section includes programs that run as templates under Microsoft Excel. The third contains one-write programs, which are fading in use as other programs gain in power and become easier to use. The fourth section includes the all-in-one programs—these programs contain a minimum of G/L, A/P (Accounts Payable), and A/R in one seamless, integrated program.

The fifth category contains high-end programs that are geared to dedicated bookkeeping operations. These programs consist of a central G/L that integrates with separate modules such as those for A/P, A/R, inventory, or

ALL-IN-ONE APPLICATIONS										SEPARATE-MODULE APPLICATIONS	
Accountant, Inc. Professional	ACCPAC Bedford Simply Accounting	atOnce	Aware	Back to Basics: Professional	Business Sense	In-House Accountant	M.Y.O.B.	MultiLedger	Service Industry Accounting	A4	The Assistant Controller Series
Softsync/Bloc Publishing	Computer Associates	Layered	Database International	Peachtree Software	Inman Software	In-House Software	Teleware	CheckMark Software	Brown-Wagh Publishing	Softek Design	Lake Avenue Software
1.03	1.1	1.01	2.5	2	1.2	1.22	2.0	1.3	Revision 5	2.3	6.0
$595	$349	$395	$1495	$199	$179	$199	$249	$395	$395	$2300	$495
○	○	○	●	○	○	○	○	○	○	○	○
1MB	1MB	1MB	1MB	512K	512K	512K	1MB	1MB	1MB	2MB	512K
●/●	○/●	●/●	●/●	○/○	○/●	○/●	○/●	○/●	○/●	●/●	○/●
●	●	●	●	●	●	●	●	●	●	●	●
ld	1000	100/100	99	10	99	1	3844	9	1	999	999
30	none	30	unlimited	0	45	unlimited	30	unlimited	0	0	30
○	○	●	○	○	○	○	○	○	○	○	○
●	○	●	●	○	●	●	●	●	●	●	●
ld	ld	ld	ld	4500	ld	32,000	32,000	ld, lm	ld	ld	ld
ld	ld	20	ld	3	5	200	32,000	ld, lm	ld	ld	999
●	●	○	○	●	●	●	●	●	●	●	○
ld	1000	ld	9999	245	2000	2000	32,000	ld, lm	ld	ld	ld
●/●	○/●	○/●	○/●	○/●	○/●	●/●	○/●	●/●	●/●	●/●	○/●
r	r	r	b, r	b	r	r	r	r	r	b	b
○	○	●	○	○	●	○	●	○	○	○	●
●	●	○	○	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●	●	●	●
●	●	●	●	○	●	●	●	●	●	●	●
●	●	●	○	○	●	●	●	●	●	●	○
○	○	●	●	●	●	●	●	●	○	○	●
●	○	○	○	○	○	●	●	●	○	●	●
s, d	s, d	s	s, d	s, d	s, d, g	s, d, g	s, d, g	s, d, g	s, d	s, d, g	s
●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●
●	●	●	●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●	●	●	●
○	○	●	○	○	○	○	●	○	○	○	○
●	○	○	○	○	○	●	○	○	○	○	○
●	●	●	●	○	○	●	●	●	○	●	○

payroll. Every year, these programs come closer to minicomputer programs in terms of power and features although they still lack speed and multitasking capabilities. Plus, the high-end programs cost less and use a friendlier interface than do minicomputer programs.

Although I highlight the different programs in the text, you should study the comparison table closely to see how each product meets your standards. You may have to compromise your expectations somewhat, based on the available products (for example, you may have to accept numeric customer numbers rather than alphanumeric). Still, the range of Mac bookkeeping programs is broader than ever; more publishers have entered the market and older products have improved.

Small-Business Programs

It may seem odd to experienced bookkeepers that an accounting program overview includes such programs as Quicken and CheckWriter II, since these products don't offer the traditional G/L, A/P, A/R setup. Instead, they offer two categories—income and expenses—for tracking all Financial data. In the real world, however, a number of small businesses use these programs to automate their bookkeeping. Several small-business owners that I spoke to like the low cost, simplicity, and ease of use of these two programs. And because they let you organize financial information into well-defined catego-

ACCOUNTING PROGRAMS COMPARED (continued)

	SEPARATE-MODULE APPLICATIONS (CONTINUED)									
	Champion Macintosh	Components	Flexware Network Accounting	Managro Accounting Software	Great Plains Accounting Series	Insight Expert Accounting Series	Mac/Series Six Plus	(MDA) Multi-User Desktop Accounting	Pro Plus Accounting	Rags to Riches
Company	Champion Business Systems	Satori Software	Microfinancial	Managro	Great Plains Software	Layered	SBT Corporation	Logisoft	Pro Plus Software	Chang Labs
Version	1.0	1.0	6.02	3.1	5.2	2.2	6.3	2.05	1.0	3.1
Retail price[1]	$450[3]	$595	$695–$995[3]	$795[3]	$795[3]	$695[3]	$695[3]	$1795	$995	$499.95
Requires additional database program	○	○	○	○	○	○	●	○	○	○
Minimum memory required	1MB	1MB	1MB	1MB	512K	1MB	1MB	512K	1MB	512K
Imports data/exports data	○/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	○/●	○/●
Password protection	○	●	●	●	●	●	●	●	●	●
Maximum departments or profit centers	ld	ld	99	ld	999/36	999/999	99/999	99	999	99
Free telephone support in days	0	unlimited	○	90	30	30	90	30	45	90
Toll-free telephone support	●	○	○	●	●	●	○	○	●	●
Budgeting capability	●	●	●	○	●	●	●	●	●	○
GENERAL LEDGER										
Maximum # of transactions	ld	ld	ld	ld	ld	ld	ld	ld	ld	lm
Maximum # of bank accounts	ld	ld	ld, lm	ld	ld	ld	99,999	5	ld	ld
Chart of accounts										
sample set provided	●	●	●	●	●	●	●	●	○	●
maximum # of accounts	ld	ld	99,999	ld	ld	ld	99,999	ld	ld	ld
alpha/numeric	○/●	○/●	○/●	n	●/●	○/●	○/●	●/●	●/●	●/●
Processing method	r	b, r	b, r	r	b	b	b	b	b	b
Automatic reversals	●	●	●	○	●	●	●	●	●	●
Direct disbursements from G/L	●	●	○	○	○	○	●	●	●	●
Flexible fiscal periods	○	●	●	●	●	●	●	●	○	●
Enter future transactions (current year)	●	●	●	●	●	●	●	●	○	●
Enter prior-period transactions	●	●	●	●	●	●	●	●	○	●
Recurring entries	●	●	●	●	●	●	●	●	●	●
Reconcile checking account on screen	○	○	●	●	●	●	●	●	●	●
Reports										
screen, disk, graphs	s, d	s, d, g	s, d	s, d, g	s, d	s, d, g	s, d	s, d, g	s, d, g	s, d
trial balance/balance sheet	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●
income statement	●	●	●	●	●	●	●	●	●	●
transaction journals	●	●	●	●	●	●	●	●	●	●
forecasts	●	○	●	○	●	●	○	●	○	○
ratios and interpretations	○	○	○	●	●[4]	●	●	●	○	●
custom	○	●	●	●	●[5]	●	●	●	●	○

● = yes, ○ = no. *a = alpha, b = batch, d = disk, g = graphs, ld = limited by disk space, lm = limited by memory, n = numeric, r = real-time, s = screen.*

[1]Street prices are often lower than the list prices displayed. Some dealer and VAR prices may be higher, however, because they contain additional charges for such services as set-up, installation, training, or customization. [2]Price depends on which modules are purchased. [3]Price per module. [4]You can write checks. [5]Graphs can only be created in Excel. [6]Requires separate module.

ries, Quicken and CheckWriter II are far superior to the mythical shoebox that professionals often tell their clients to throw all their check stubs and receipts into so an accountant can prepare their taxes, income statements, and balance sheets. Both programs also link to SoftView's MacInTax program—a real boon when April 15 rolls around.

The high-end personal finance programs, MacMoney and MECA Software's Managing Your Money, offer the widest range of categories. For instance, both programs let you carry a dedicated A/R Asset category and an A/P Liability category so that you can clearly track assets and liabilities. MacMoney even offers a separate, integrated program for preparing invoices, so you do not have to type them. Managing Your Money doesn't offer invoicing, but it includes excellent supplementary financial features such as loan calculations and investment tracking and provides an excellent calendar for tracking deadlines and due dates.

CYNTHIA MOORE

Bruce Miller, who composes music for movies and television shows such as "Knots Landing" and "Designing Women," uses Teleware's M.Y.O.B. to manage the finances of his Chatsworth, California–based company, Come Sopra Music. Miller likes the fact that M.Y.O.B. enforces good accounting practices—even though that means erroneous entries, once saved, cannot be easily corrected.

Excel Template Programs

The Excel template category covers a wide gamut of programs. My personal bias is toward the two programs at the upper and lower end. At the upper end, Computerized Classic Accounting is as powerful and complete as any high-end accounting program, and it is targeted at the user who likes to keep books in the traditional manual format. With very little effort, you can start using electronic forms that duplicate traditional manual ones. Computerized Classic Accounting is a good alternative to the all-in-one programs for users experienced in traditional manual bookkeeping processes.

At the low end, I was impressed by Minimum Requirements, which is about as clean and simple as the low-end personal finance programs, Quicken and CheckWriter II. Mathesis's Fiscal Knowledge is a step above Minimum Requirements, offering additional features with some sacrifice of simplicity. Both programs are good alternatives to the personal finance packages for very small businesses.

An obvious advantage of the Excel-based programs is that you can use all of Excel's features (such as macros and graphing capabilities) to manipulate financial data. On the minus side, of course, there's the separate cost of purchasing Excel. And many accounting programs allow you to export reports to a spreadsheet or word processor, thus giving you the same data-manipulation benefits that an Excel template offers.

One-Write Programs

One-write programs are modeled after the manual one-write system. With the one-write system, the user enters each check amount twice—first as a check payment amount and the second time as a category charge. For example, to make a $500 payment for rent, you enter $500 as a pay-out amount from your checkbook, and you make another entry under Rent to charge the payment to that category.

Although formerly popular with small businesses, the one-write programs have lost much of their edge. The main appeal of these programs was simplicity. In addition, users who had kept books manually for a small business were already familiar with the one-write system. As other types of accounting programs have gotten easier and easier to use, interest in the one-write system has declined. If you're one of the remaining small-business people satisfied with working in the manual one-write environment, you'll feel comfortable with either Great Plains Software's Plains & Simple or Layered's Insight One Write. Chances are good that the reports produced by either program will provide all the information your accountant needs to prepare year-end results and tax filings, but you should check with your bookkeeping firm to make sure.

All-in-One Programs

The all-in-one category offers the widest range of programs—from those for the manager who keeps books on the side while running the business or while working at a full-time job, all the way to those for the dedicated in-house person who handles the books and paperwork for a small business.

M.Y.O.B., a program with G/L, A/P, A/R, and a simple inventory segment, offers features found in general programs costing much more. It has an outstanding administrative center for recording notes, calendar items, and deadlines. It also allows you to pay past-due bills or dial the telephone (through a modem) directly from the administrative center.

At the low end of the all-in-ones, In-House Software's In-House Ac-

countant stresses simplicity by using a single entry screen for all transactions. This program also includes a fairly good assortment of reports for your accountant. Going one step up, you'll find Business Sense, Layered's atOnce, and CheckMark Software's MultiLedger. Each of these programs has its own special attractions. Business Sense offers integrated payroll and job costing (but no inventory) in addition to G/L, A/P, and A/R. atOnce offers one of the best Mac interfaces of all the accounting applications. It has G/L, A/P, and A/R, plus an integrated payroll. atOnce lacks an inventory segment, but its wide range of features and outstanding interface make it one of the most appealing programs in its category.

MultiLedger offers inventory (but no job costing) in addition to its G/L,

ACCOUNTING PROGRAMS COMPARED (continued)

	PERSONAL APPLICATIONS				EXCEL-TEMPLATE APPLICATIONS			ONE-WRITE APPLICATIONS	
	CheckWriter II	MacMoney	Managing Your Money	Quicken	Computerized Classic Accounting	Fiscal Knowledge	Minimum Requirements	Insight OneWrite	Plains & Simple One-Write
ACCOUNTS PAYABLE		○[1]	○[1]	○[1]					
Maximum # of vendors	ld	NA	NA	NA	ld	ld	lm	ld	ld
Maximum # of transactions	ld	NA	NA	NA	lm, ld	ld	lm	ld	ld
Enter prior-dated invoices	●	NA	NA	NA	●	●	●	●	●
Recurring transactions	●	NA	NA	NA	●	●	○	○	○
Stores transactions by									
invoice number	●	NA	NA	NA	●	●	○	○	○
assigned document number	●	NA	NA	NA	●	●	○	●	○
date	●	NA	NA	NA	●	●	○	●	○
Allows one-time vendors	●	NA	NA	NA	●	●	●	●	○
Carries over unpaid invoices	●	NA	NA	NA	●	●	●	○	●
Batches invoices for payment	●	NA	NA	NA	●	●	○	○	●
Calculates discount	○	NA	NA	NA	●	●	○	●	○
Allows user-defined memos on checks	●	NA	NA	NA	●	○	○	○	●
Reports		NA	NA	NA					
screen, disk, graphs	s, d, g	NA	NA	NA	s, d, g[2]	s, d, g[2]	s, d, g[2]	s, d	s
detailed year-to-date	●[1]	NA	NA	NA	●	●	○	○	●
vendor transactions									
aged A/P	○	NA	NA	NA	●	●	○	○	●
custom	○	NA	NA	NA	●	●	●	○	○
Prints mailing labels	●	NA	NA	NA	○	○	○	○	●
ACCOUNTS RECEIVABLE		●[3]	○[1]						
Maximum # of customers	ld	2000	NA	ld	lm, ld	ld	lm	ld	ld
Maximum # of transactions	ld	6000	NA	ld	ld	ld	lm	ld	ld
Enter prior-dated invoices	●	●	NA	○	●	●	●	●	●
Recurring transactions	●	○	NA	●	●	●	○	○	○
Calculates finance charges	○	○	NA	○	○	○	○	●	○
Provides customer credit limits	○	○	NA	○	●	○	○	○	●
Tracks (by salesperson/by commission)	○/○	○/○	NA	○/○	●/●[4]	●[4]/○	●[4]/○	○/○	○/○
Separate bill-to and ship-to address	○	○	NA	○	●	○	●	○	○
Reports									
screen, disk, graphs	s, d, g	s, d	NA	s, d	s, d, g[2]	s, d, g[2]	s, d, g[2]	s, d	s
detailed year-to-date customer transactions	●	●	NA	●	●	●	●	●	●
aged A/R	○	●	NA	○	●	●	○	●	●
customer invoices/customer statements	○/○	●/●	NA	○/○	●/●	●/●	●/○	●/●	○/●
custom	○	●	NA	●	●	●	●	○	○
Prints mailing labels	●	○	NA	○	○	○	○	●	○
Prints dunning message	○	○	NA	○	○	○	●	●	○
Accounting method (cash/accrual)	●/○	○/●	●/●	●/●	●/●	●/●	●/●	●/○	●/●
Other modules included[5]	none	none	none	none	I, J, P	none	none	none	none
Additional modules available[5]	none	In	none	none	B, D, F, R	none	none	none	none

● = yes, ○ = no. *a = alpha, b = batch, d = disk, g = graphs, ld = limited by disk space, lm = limited by memory, n = numeric, r = real-time, s = screen.*

[1]Must create a category for this function. [2]Graphs can only be created in Excel. [3]Requires separate module. [4]Can be done in Excel. [5]Modules: B = budgeting, D = departments, Da = data analysis, F = forecasting, I = inventory, In = invoicing, J = job costing, O = order entry, P = payroll, Pu = purchasing, R = reporting, S = sales order.

A/P, A/R. This excellent middle-weight performer is extremely easy to use, simple to understand, and fairly flexible. It has a separate payroll program, which is the best of all Mac payroll programs and which feeds data automatically into MultiLedger. This payroll program also allows you to easily update payroll-tax tables yourself rather than forcing you to buy updates from the publisher (most publishers charge around $100 for each annual update). No other program in MultiLedger's price class offers this feature.

Moving up another notch, Computer Associates' ACCPAC Bedford Simply Accounting has been very successful due to its relatively low price for performance; its ease of use; and its G/L, A/P, and A/R with integrated inventory, job costing, and payroll

ALL-IN-ONE APPLICATIONS										SEPARATE-MODULE APPLICATIONS	
Accountant, Inc. Professional	ACCPAC Bedford Simply Accounting	atOnce	Aware	Back to Basics: Professional	Business Sense	In-House Accountant	M.Y.O.B.	MultiLedger	Service Industry Accounting	A4	The Assistant Controller Series
Id	1000	Id	Id	115	2000	2000	32,000	Id, Im	Id	Id	Id
Id	Id	Id	Id	1200	Id	32,000	32,000	Id, Im	Id	Id	Id
●	●	●	●	●	●	●	●	●	●	●	●
○	○	●	●	○	●	●	○	●	○	○	●
●	○	●	●	●	○	●	●	●	●	●	●
●	○	●	●	○	○	●	○	●	●	●	○
●	●	●	●	○	●	●	●	●	●	●	●
○	●	●	●	●	●	○	○	●	●	●	●
●	●	●	●	●	●	●	●	●	●	●	●
●	○	●	●	●	●	○	●	●	●	●	●
○	○	●	●	●	●	○	●	●	●	●	●
●	○	●	○	○	○	●	●	●	●	●	○
s, d	s, d	s	s, d	s, d	s, d, g	s, d, g	s, d, g	s, d, g	s, d	s, d, g	s
●	●	●	●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●	●	●	●
●	○	●	●	○	○	●	●	●	○	●	○
●	●	●	○	●	●	○	●	●	●	●	○
Id	1000	Id	Id	400	2000	2000	32,000	Id, Im	Id	Id	Id
Id	Im	Id	Id	2000	Id	32,000	32,000	Id, Im	Id	Id	Id
●	●	●	●	○	●	●	●	●	●	●	●
●	○	●	●	○	●	●	○	●	○	○	●
●	●	○	●	●	●	○	●	○	○	●	●
●	○	●	●	●	●	○	●	○	○	●	○
●/○	●/○	○/○	●/●	○/○	●/●	○/○	●/○	●/●	○/○	●/●	●/●
●	●	●	●	●	●	○	●	●	●	●	●
s, d	s, d	s	d, g	s, d	s, d, g	s, d, g	s, d, g	s, d, g	s, d	s, d, g	s
●	●	●	●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●	●	●	●
●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●	●/●
●	○	●	●	○	○	●	●	●	○	●	○
●	●	●	○	○	●	○	●	●	●	●	○
●	○	●	○	●	○	○	●	○	●	●	○
●/●	○/●	○/●	●/●	○/●	●/●	●/●	●/●	●/●	●/●	○/●	●/●
I, J, P	I, J, P	P	none	In	J, P	none	B, Da, F, I, In, J, O, Pu	I	I	B, D, Da, I, In, O, Pu, R, S	none
none	none	none	none	none	none	none	none	P	none	none	R

segments. A bit more sophisticated, Softsync's Accountant, Inc. Professional offers the same segments, but each with extended capacity, more powerful features, and comparable ease of use. The additional power comes at a somewhat higher price, however. I was favorably impressed by this new version of Accountant, Inc.

A specialized program, Aware, offers the standard G/L, A/P, and A/R segments and even claims to handle dual currencies. Manapro Accounting Software goes a bit further by allowing you to keep the G/L, and prepare reports, in any of six languages—English, Spanish, Portuguese, French, German, and Italian. You can keep books in dollars, marks, or yen, and you have several choices for formatting dates. Currently the G/L does not link to any other Macintosh accounting programs, so you're limited to G/L functions.

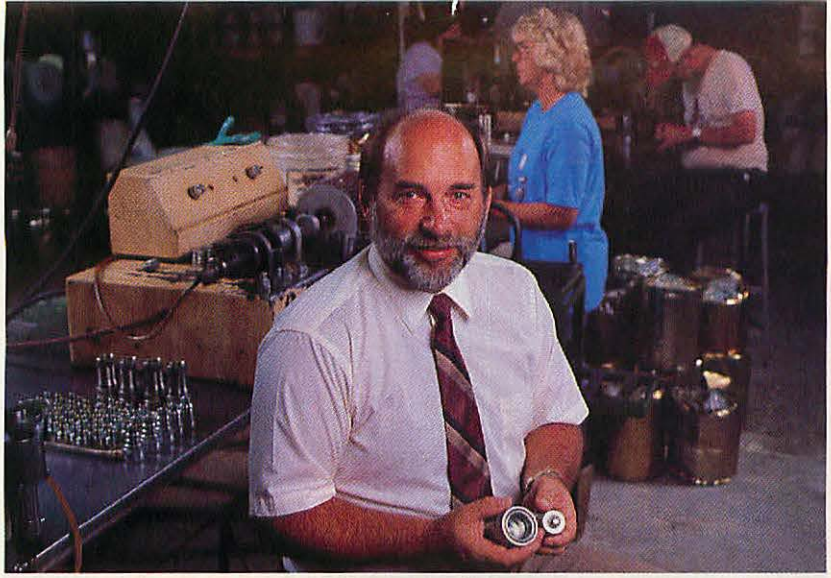
The other entries in this category

ACCOUNTING PROGRAMS COMPARED (continued)

	SEPARATE-MODULE APPLICATIONS (CONTINUED)									
	Champion Macintosh	Components	Flexware Network Accounting	Manapro Accounting Software	Great Plains Accounting Series	Insight Expert Accounting Series	Mac/Series Six Plus	(MDA) Multi-User Desktop Accounting	Pro Plus Accounting	Rags to Riches
ACCOUNTS PAYABLE										
Maximum # of vendors	ld	NA	ld	ld	ld	ld	ld	ld	ld	ld
Maximum # of transactions	ld	NA	ld, lm	ld	ld	ld	ld	ld	ld	lm
Enter prior-dated invoices	●	NA	●	●	●	●	●	●	●	●
Recurring transactions	○	NA	●	●	●	●	●	●	●	○
Stores transactions by										
invoice number	●	NA	●	●	●	●	●	●	●	●
assigned document number	○	NA	○	●	●	●	○	●	○	●
date	●	NA	○	●	●	●	●	●	●	●
Allows one-time vendors	○	NA	○	●	●	●	●	●	●	●
Carries over unpaid invoices	●	NA	●	●	●	●	●	●	●	●
Batches invoices for payment	●	NA	●	●	●	●	●	●	●	●
Calculates discount	●	NA	●	○	●	●	●	●	●	●
Allows user-defined memos on checks	○	NA	●	●	●	○	○	●	○	●
Reports										
screen, disk, graphs	s, d	NA	s, d	s, d, g	s, d	s, d, g	s, d	s, d, g	s, d	s, d
detailed year-to-date vendor transactions	●	NA	●	●	●	●	●	●	●	●
aged A/P	●	NA	●	●	●	●	●	●	●	●
custom	○	NA	●	●	●[3]	●	●	●	●	○
Prints mailing labels	●	NA	○	●	○	●	●	●	●	●
ACCOUNTS RECEIVABLE										
Maximum # of customers	ld	ld	ld	ld	ld	ld	ld	ld	ld	ld
Maximum # of transactions	ld	ld	ld, lm	ld	ld	ld	ld	ld	ld	lm
Enter prior-dated invoices	●	●	●	●	●	●	●	●	●	●
Recurring transactions	●	●	●	●	●	○	●	●	●	○
Calculates finance charges	●	●	●	●	●	●	●	●	●	●
Provides customer credit limits	●	●	●	●	○	●	●	●	●	●
Tracks (by salesperson/by commission)	●/○	●/●	●/●	●[3]	●/●	●/●	●/○	●/●	●/●	●/●
Separate bill-to and ship-to address	●	●	●	●[3]	●	●	●	●	●	●
Reports										
screen, disk, graphs	s, d	s, d, g	s, d	s, d, g	s, d	s, d, g	s, d	s, d, g	s, d	s, d
detailed year-to-date customer transactions	●	●	●	●	●	●	●	●	●	●
aged A/R	●	●	●	●	●	●	●	●	●	●
customer invoices/customer statements	●/●	●/●	●/●	●/●	●[3]/●	●/●	●/●	●/●	●/●	●/●
custom	○	●	●	●	●[3]	●	●	●	●	○
Prints mailing labels	●	●	●	●	●	●	●	●	●	●
Prints dunning message	●	●	●	●	○	○	●	●	●	●
Accounting method (cash/accrual)	○/●	●/●	●/●	either	●/●	●/●	●/●	○/●	○/●	●/●
Other modules included[5]	none	none	none	none	none	none	none	none	none	none
Additional modules available[5]	none	none	I, J, O, P, Pu, S	P, I, S, In, B	Da, I, J, O, P, Pu, R	I, In, P	I, P, Pu, S	none	none	I, In

● = yes, ○ = no. *a = alpha, b = batch, d = disk, g = graphs, ld = limited by disk space, lm = limited by memory, n = numeric, r = real-time, s = screen.*

[1]Must create a category for this function.. [2]Graphs can only be created in Excel. [3]Requires separate module. [4]Can be done in Excel. [5]Modules: B = budgeting, D = departments, Da = data analysis, F = forecasting, I = inventory, In = invoicing, J = job costing, O = order entry, P = payroll, Pu = purchasing, R = reporting, S = sales order.



ALVIS UPITIS

Mike Rosenwald, a controller at Safeway Hydraulics (in Chaska, Minnesota), chose the General Ledger module of Satori Software's Components for its ability to design custom reports. "My reports are a mirror image of those I used previously with my manual system," says Rosenwald. On the downside, Rosenwald is irritated that Components lets him retrieve only monthly figures for the previous year, not the total yearly figures.

have no real distinguishing features. For instance, Peachtree Software's Back to Basics: Professional is geared to the service business, but pales next to Brown-Wagh's Service Industry Accounting, which targets the same user.

Separate-Module Programs

The programs that come packaged as separate modules are the most powerful—and most expensive—accounting programs. Although these programs are designed for the full-time bookkeeper, someone experienced in bookkeeping should have little trouble using them. Many of these programs have multiuser capabilities—a requirement for many bigger businesses. These programs can be complex and may require that you have strong dealer support on site, and may perhaps even require that you dedicate an employee to maintain, or assist in maintaining, the network.

Although there is no real bottom or top end for these types of programs, Chang Labs' Rags to Riches is the least desirable of the packages. The program requires manual transfers of data to the G/L, and the help lines are skimpy. And although it makes excellent use of the Mac interface, the program's forms are quite different from the conventional ones found in other programs or in a manual environment.

If you're looking for a wide range of applications, you should examine the excellent offerings from Great Plains, SBT, and Microfinancial (Flexware Network Accounting). Programs from all three companies include an extensive range of modules to augment the basic G/L, A/P, A/R, Inventory, and Payroll segments, and their range of reports is excellent. Great Plains prides itself on service and support, both directly from the company and through its extensive dealer network. Microfinancial and SBT depend mainly on dealers to install and maintain programs and train people, although the publishers do offer strong direct support when called upon. Parentage is also apparent in these programs: Great Plains has a decided MS-DOS cast, SBT shows its dBase (now FoxBase+/Mac) source, and Flexware shows a plain vanilla interface that allows it to exchange data between Macs, MS-DOS–based computers, and minicomputers. (Microfinancial says it will overhaul the interface for the next version of Flexware to make it more Mac-like.)

Although Great Plains, SBT, and Microfinancial are all working to improve the interface for their products, Layered's Insight Expert Accounting Series wins an award for the best overall use of the Mac interface for high-end programs. The screen forms are excellent, and the program allows you to move easily from task to task. Plus, the program offers a live link to the 4th Dimension database program. But the series is not multiuser (although modules can be shared on a local network),

MULTIUSER PROGRAMS

Several companies offer multiuser versions of their products. Here are the requirements for each of those programs.

A4, SOFTEK DESIGN
Cost: $2500
File servers supported: AppleShare, Novell, UShare
Maximum concurrent users: 3–20, depending on the network

AWARE, DATABASE INTERNATIONAL
Cost: $795 (G/L only), $1495 (G/L, A/P, A/R)
File servers supported: AppleShare, TOPS
Maximum concurrent users: 25

COMPUTERIZED CLASSIC ACCOUNTING, ABSOLUTE SOLUTIONS
Cost: $50 for each workstation plus the cost of the program (program prices run from $395 to $995 depending on which modules are purchased)
File servers supported: AppleShare, 3Com, Novell, TOPS
Maximum concurrent users: Limited by network

FLEXWARE NETWORK ACCOUNTING, MICROFINANCIAL
Cost: $695 to $995 per module
File servers supported: AppleShare, Flexshare, TOPS (not recommended)
Maximum concurrent users: Limited by network

GREAT PLAINS ACCOUNTING SERIES
Cost: $495 to $995 per module
File servers supported: AppleShare, TOPS
Maximum concurrent users: Limited by network

MULTI-USER DESKTOP ACCOUNTING
Cost: $1195 to $1795 for 1 user, $1995 to $2795 for 5 users, $2995 to $3795 for 10 users, $3395 to $4795 for 20 users
File servers supported: AppleShare, DaynaTalk, Novell, TOPS
Maximum concurrent users: 250

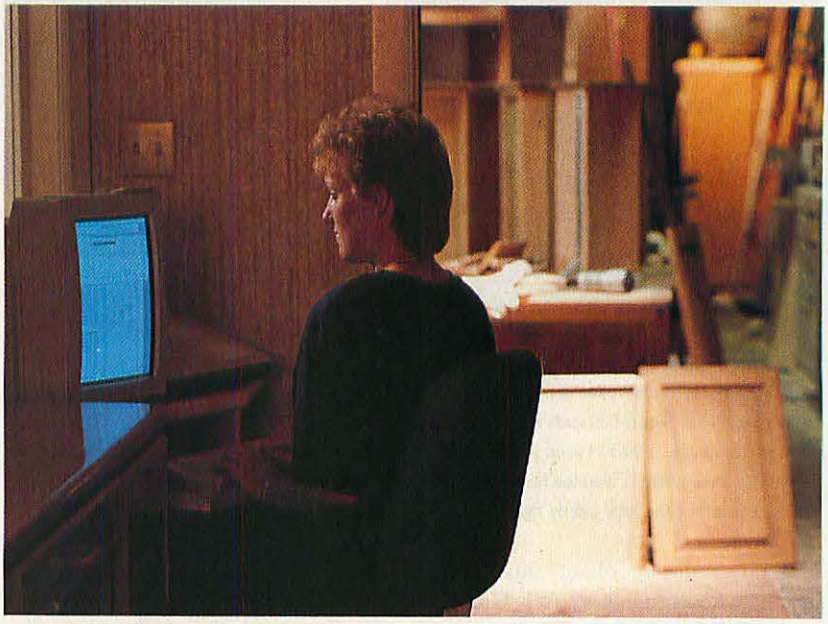
SBT MAC SERIES SIX PLUS
Cost: $695 per module
File servers supported: AppleShare, 3Com, LANtastic, Novell, TOPS
Maximum concurrent users: Limited by the network

and it does not offer the range of specific applications provided by Great Plains, SBT, or Microfinancial.

Pro Plus Software's Pro Plus Accounting offers the power of a modular program, but because the modules are so well integrated, it looks more like an all-in-one program. The integration, however, doesn't mean that Pro Plus Accounting is Mac-like—the program's screens and forms resemble those of an MS-DOS–based program. Still, Pro Plus Accounting is a highly competent program.

Softek Design's A4 and Satori's Components are two high-end programs that offer a great deal of flexibility. Since A4 uses the 4th Dimension database as its engine, the modules can be quickly and easily customized by anyone proficient in 4th Dimension code. The program also takes advantage of 4th Dimension features such as form-letter generation and mail merge. Unfortunately, the screens that come programmed into A4 contain fields in a bland columnar layout only.

Last year, Components had only a G/L module, but this year the program also includes an A/R module. (An A/P module is in the works.) Components' best feature is the great flexibility it gives users in designing customized reports. For instance, reports can be enhanced with graphics and printed in PostScript. Although Components' interface is not in a class with Insight Expert's, Components was designed within the Mac environment and works more smoothly than than the other programs in this category.



KEN PROBST

Barbara March finds no fault with ACCPAC Bedford Simply Accounting. March, a bookkeeper at Cordoza's, a custom cabinetmaker in Redwood City, California, uses the program's job and labor costing functions heavily. March also finds Simply Accounting true to its name—very easy to use.

Picking the Right Program

As you can see, the Mac supports a wide range of accounting programs for just about any size or type of business. And all of them are designed to offer certain strong features that are needed by a majority of users. How do you pick the program that's best for you?

- First, check with your accountant and/or bookkeeping firm. Since they have to work with your records, they should take an active role in choosing a package. If you have a dedicated bookkeeping group in your company, you should examine the full-featured programs to find the one that best meets your specific needs.
- After reading about the principal features of each program, carefully examine the specific features of the ones that interest you by scanning "Accounting Programs Compared."
- Don't be afraid to cross over categories. If you own a small business, you don't *have* to use a one-write or personal finance program; consider the all-in-one packages if they have the features you want at a price you can afford. The all-in-one packages are fairly easy to use, and most require little more effort than lower-end programs.
- Invest in programs with separate modules if you have a strong bookkeeping background. You can start with the G/L module and then add the A/P or A/R later. If you have a lot of bookkeeping experience, you may not be happy working with the other types of packages.
- Try the packages you're interested in. If you are shopping for off-the-shelf packages, examine the programs at a dealer's. If you're looking at a customized program, get a sample program and work with it a short while. Your value-added reseller or dealer can then customize it with features you want.
- Contact the publisher for additional information. The company can generally offer a great deal of help.
- Ask questions: How are certain procedures performed? How do you create various reports? Can you customize the program? Where do you get help? Can you purchase updates at a discount? If it's a complex package, how can people be trained? How much will extended support cost? Where do you purchase checks and forms?
- Take care in making a final selection. If you change to a new program, you'll have to set up your books all over again.

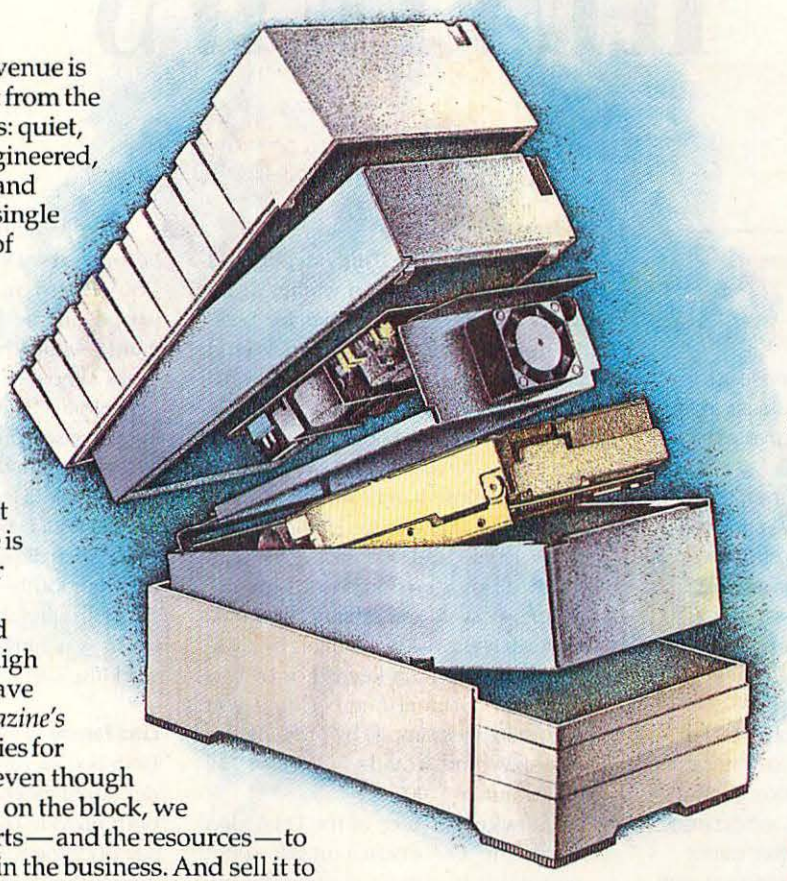
Clearly there's a lot involved in purchasing an accounting program. Fortunately for the Macintosh user, the number and quality of programs is growing each year. This year I reviewed 30 products, not including those that are specialized for a niche market. Some programs, such as CheckMark's Multi-Ledger and Teleware's M.Y.O.B., offer a good deal for your dollars. Others, such as programs from MicroFinancial, SBT, Great Plains, and Layered, provide the maximum in power. Still others, such as Quicken and CheckWriter, shine at ease of use. Many others fill the cracks between these programs. Best of all, very few of the programs will disappoint you. ■

See *Where to Buy* for contact information.

***Alan L. Slay** is a free-lance writer based in Saint Louis. He specializes in financial and accounting software.*

How The New Kid On The Block Made The Best Drive In The Business

The Protegé from MacAvenue is everything you'd expect from the best drive in the business: quiet, cool, quick, elegantly engineered, tough enough to travel, and priced to move. But the single most important feature of this handsome little box has more to do with its ancestry than with its aggressive price.

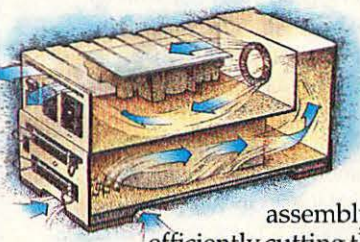


The Protegé hard drive features an out-standing pedigree. That's because the parent company of MacAvenue is CompuAdd, a computer industry leader in value, performance, service and support. CompuAdd's high quality and low prices have made it one of *INC. Magazine's* fastest-growing companies for three years running. So even though MacAvenue is a new kid on the block, we showed up with the smarts—and the resources—to build you the best drive in the business. And sell it to you for the best price on the market.

Exclusive!

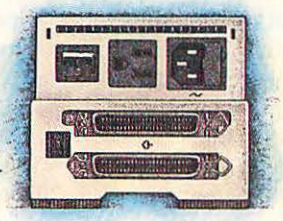
You'll Never Lose A File
Your MacAvenue Protegé is the only drive on the market to come bundled with On Location, the amazing file-finding utility that will search your entire hard disk and find a lost file in seconds. Just type in a file name or even a few words within the file. On Location does the rest. This utility was created by Mitch Kapor, developer of Lotus 1-2-3. ***A $129.95 value.***

Here's how the Protegé will turn you on:

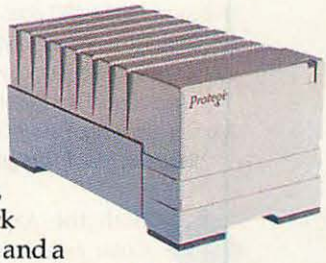


It's Really Cool
A drive that keeps its cool also keeps its reliability. The Protegé is a really cool machine because it maximizes air flow across its drive assembly and its isolated power supply—efficiently cutting the danger of heat-related failure from the two most important parts of your drive.

Attention to Details
Even the back of the Protegé is loaded with smart features. Like an extra power outlet for other drives or peripherals. A push-button SCSI ID setting. And an external terminator for convenience.



Loaded with Smart Software
Your Protegé will arrive pre-formatted and ready for work, loaded with easy-to-use, custom-designed utilities. The Protegé's Disk Management Software allows you to partition for more efficient drive operation and password protect each partition. The software even allows for disk spanning and creation of ProDOS and UNIX partitions.



Drive Your Bargain
Like all MacAvenue products, the Protegé is backed by superior documentation, a 30-day, no-questions-asked, money-back guarantee, a one-year warranty and a toll-free technical support line. So call now. And drive a bargain on the best drive in the business.

Protegé Hard Drives

Capacity	External		Internal	
	Seagate	Quantum	Seagate	Quantum
20+MB	$345	n/a	$295	n/a
40+MB	$395	$455	$325	$375
80+MB	$525	$645	$465	$595
100+MB	$649	$695	$575	$645

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REVIEWS

Color Video Boards

DIGIVIDEO COLOR

Pros: Inexpensive; simple to use; can save and apply optimal settings for television channels; comes with tuner and speaker. **Cons:** Grainy images; poor performance; not many software features. **Company:** Aapps Corporation. **Requires:** Mac II; 8-bit graphics adapter. **List price:** $995.

VIDEO COLORBOARD 364

Pros: Includes 24-bit display adapter; sophisticated video-display controls; can run video from DA or application; displays full-screen 640-by-480 video without menus. **Cons:** No tuner; no speaker; cannot output color to videotape; works only with AppleColor High-Resolution RGB Monitor. **Company:** Raster-Ops Corporation. **Requires:** Mac II. **List price:** $1995.

Both the Aapps DigiVideo Color board and the Raster-Ops Video ColorBoard 364 allow you to watch live video from a VCR, television, or laserdisc player in a window on the Macintosh. Even better, they enable you to save frames from these sources to disk, where you can edit them and include them in presentations, newsletters, or anyplace you would normally use a Macintosh graphic. The similarity between the two boards, however, ends there.

For users concerned with image quality and speed, the Video ColorBoard 24 is by far the better choice. It's also far more flexible. But if you only want to cue a video, scan television channels for a certain clip, or facilitate teleconferencing on the Mac, then the DigiVideo board is the least-expensive solution around.

The Facts

At first glance, the DigiVideo board seems like an all-around winner. It includes speakers and a tuner for picking up VHF and UHF channels and cable television—the only additional equipment you need is a television antenna. And the DigiVideo is incredibly easy to use. Anyone who owns a television will immediately know how to use the Aapps DigiVideo Color board's clearly labeled 3-D controls. You can display all of the controls or only the volume, power, and channel buttons. You switch television channels by clicking on an on-screen keypad or by typing in the channel number, and you capture images simply by pressing the space bar. And would you believe, all this for under $1000.

At twice the price of the DigiVideo board, the ColorBoard might seem overpriced. It doesn't support broadband cable for professional-level image capture. In addition, to display a television signal with the ColorBoard, you must purchase a RasterOps tuner ($495) or connect a television to a VCR or be lucky enough to own a television with a video-out socket. The ColorBoard doesn't include speakers either; to get sound you have to purchase speakers to attach to the Mac, use earphones to listen to the VCR, or hook up a television set.

But it only takes a few minutes of use to figure out that the ColorBoard is the better deal for most users. First, the ColorBoard supports both composite video and the much higher quality S-Video; the DigiVideo supports only composite video. The ColorBoard displays and captures video in 24-bit mode (the board also offers an option to convert 24-bit images to 8-bit for applications that don't support 24-bit images). The DigiVideo, on the other hand, always converts 24-bit images to lower-quality 8-bit.

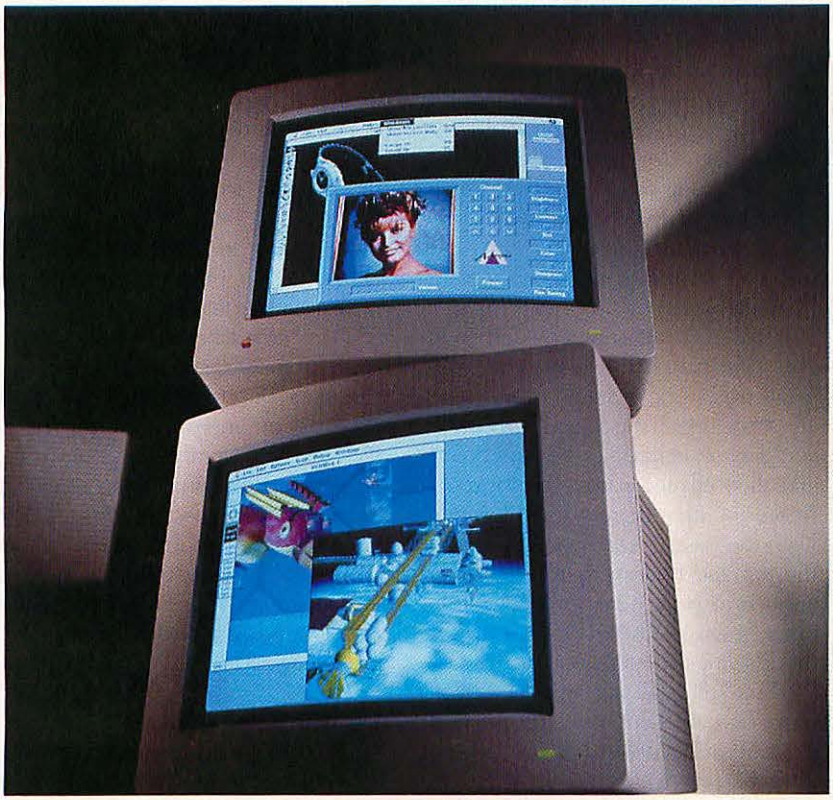
The resulting difference in quality between the DigiVideo board and the ColorBoard is eye-popping. Video played on the DigiVideo board looks grainy while the ColorBoard's video looks almost as good as it does when played on a television. The ColorBoard images also run faster (30 frames per second) than those displayed by the DigiVideo (22 frames per second). With the DigiVideo board, the video flickers a bit. Video displayed by the ColorBoard runs smoothly—so smoothly, in fact, that I frequently found myself caught up in watching the video rather than working.

Extra Feature

Both boards run in the background under MultiFinder (albeit very slowly) and both provide controls for adjusting image brightness, contrast, hue, and saturation. But the ColorBoard offers many more conveniences. For instance, the ColorBoard can display and capture images via a desk accessory or with its FrameGrabber application. While the DigiVideo limits you to video display window sizes of 3.6 by 3 inches or 1.8 by 1.5 inches, the ColorBoard offers a small display size with a 320-by-240-pixel resolution, and a large size that can be as big as the Mac's 13-inch screen. The large size includes a black border that hides menus for those instances when you want to impress an audience with a video presentation. (You can still access the software features by using the keyboard.)

Both boards display video in one window and the most recently captured image in another. When you capture an image with the DigiVideo board, the image is sent to the Clipboard in PICT2 format. You can keep the Clipboard visible behind the video window at all times in order to see what you have captured. To save the image, however, you must copy it from the

LUIS DELGADO "TWIN PEAKS" LYNCH/FROST PRODUCTIONS



The Aapps DigiVideo Color board (top) lets you watch television in a window on a Mac; the 3-D button controls are self-explanatory. The RasterOps ColorBoard 364 (bottom) is a better bet for capturing images from a VCR or laserdisc. It includes an on-screen tool palette for editing images.

Clipboard into an application.

Therein lies my biggest complaint about the DigiVideo. For anything more than casual image capture, the Clipboard-to-application copying routine gets old fast. The ColorBoard, on the other hand, lets you quickly grab an image and display it in the FrameGrabber application by pressing ⌘-G. Once the image is captured you can save it as a PICT or TIFF file using the familiar ⌘-S.

The ColorBoard's best image-capture feature is that it enables you to save a series of frames to Macintosh memory. The FrameGrabber software tells you how many frames you can capture based on the memory in the Mac and the size of the image. (FrameGrabber includes a marquee for indicating the size and portion of the image you would like to capture.) You then choose any number of frames up to the maximum.

Why did I like this feature so much? First, image capture is instantaneous when the interval is set to 0. Second, once the frames are captured to memory, FrameGrabber displays a dialog box that lets you scroll through the frames one by one. If you set the interval to 0, you can actually see the precise movements and changes between frames. For instance, you can choose whether you want to save a frame where a dancer's leg is all the way up, halfway up, or somewhere in between. You can delete or save individual frames. Alternatively, you can save the entire series as a PICS file for importing as an animation sequence into MacroMind Director.

The RasterOps ColorBoard also lets you save a series of images to disk, although this does not allow you to capture frames as quickly and doesn't let you see such precise changes. It does, however, let you save more frames at once. Using a Mac IIcx with 8MB of RAM, I was only able to capture 9 index card–size frames to memory. The same size images created files of 158K to 190K—I could capture quite a lot of these at once before filling up an 80MB hard disk. A full-screen image of ET took up almost a megabyte of disk space, however.

The ColorBoard also offers other high-end video-display controls and image-editing capabilities not found on the DigiVideo. You can control the speed at which frames are displayed—up to 30 frames per second—and you can opt to display only odd or only even fields as opposed to whole frames. You can flip images vertically or horizontally, rotate them right or left, resize them proportionally, or squeeze or stretch them into any rectangle that you define. More-sophisticated users can experiment with creating and saving color ramps (the red, green, and blue levels for each different level of brightness in a single frame) that can then be applied to other images.

The DigiVideo Color board comes bundled with an INIT called Exposure that creates PICT images from the Macintosh's screen and includes basic image-editing tools such as a pencil, paintbrush, eraser, rectangle, line, and oval. Although not nearly as sophisticated as the ColorBoard's FrameGrabber application, Exposure is simple and works solidly.

No One's Perfect

The RasterOps ColorBoard is a high-end video-capture board with many conveniences for anyone who is serious about including video images in other files. The interface is well thought out and the manual offers excellent explanations of the board's features. The ColorBoard is a bit too expensive for someone who just wants to digitize a few home-video images, however. That expense includes not only the base cost of the board, but also the amount you need to pay for memory and a high-capacity hard disk drive to really take advantage of all of the board's features.

The Aapps DigiVideo board, on the other hand, fails in image quality, performance, and flexibility compared to the ColorBoard. But it does provide an inexpensive, convenient way to cue up videos or watch television in a small on-screen window. And for some users those features may be enough. Personally, I'd opt for the ColorBoard in spite of its cost and hardware requirements—it has enough features to keep me from feeling limited after only a short time.

—Cheryl England Spencer

See* Where to Buy *or circle 749 (DigiVideo), 896 (Video ColorBoard 364) on reader service card.

Page-Makeup Program

QUARKXPRESS 3.0

Pros: Greatly improved interface; precision measurements throughout; polygonal, reshapable picture boxes; flexible master pages; library for storing page elements; free rotation of text; trapping for spot and process colors.
Cons: Slow; cannot select items in back; can't see objects as they move; styles override local formatting; buggy.
Company: Quark. **Requires:** Mac Plus; 2MB RAM; hard disk drive. **List price:** $795.

The game of leapfrog between PageMaker and QuarkXPress, the two leaders in Mac page-makeup software, has advanced another jump with the release of QuarkXPress version 3.0. And it is a big jump. Quark has now solidified QuarkXPress's position as the leader in power features for page makeup, while also greatly enhancing its user interface—the sticking point that has kept so many people away from the program in the past.

The new package fulfills almost every QuarkXPress user's wish. And when Quark implements a new feature, it goes whole hog with it, so what would be just a bunch of bells and whistles becomes gongs and trumpets.

Streamlined Interface

By far the biggest problem with previous versions is now fixed: you can select multiple items, either by Shift-clicking or by dragging a marquee. You can group the multiple selected items, align them (at top, middle, bottom, left, center, right), align them with spacing (distribute them), and lock them so they can't be moved with the mouse.

The parent-child relationship between boxes was a close second on the infuriation index (child boxes had to move with their parents and couldn't go outside them), and that problem has been fixed, too. Quark has renamed the feature Auto Constrain and demoted it from an inviolable constraint to a selectable option.

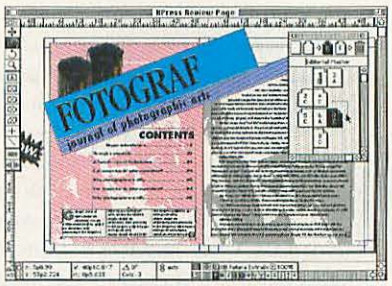
QuarkXPress 3.0 lets you work on an underlying pasteboard, so it's easy to drag items off the page and to create bleeds. Other interface improvements include a new measurements palette (both this and the tool palette are now floating windows), which lets you see and change the specifications for any selected item—text, graphic, or imported picture—without resorting to multiple dialog boxes. You can simply drag items between open documents (every program should offer this), and there's a customizable zoom tool in the toolbox.

There are still a few wrinkles, however. The pasteboard is not common to all pages, for example; it's just an area on which all the pages lie. So when you drag an item onto the pasteboard and then change pages, don't expect to see the item there waiting for you. Also, the pasteboard isn't very big; at the top and bottom there's less than an inch to store items (though the library, discussed below, makes up for these failings admirably).

You still can't see objects as you move or scale them (only the outline); you can't select objects that are behind other objects (which makes for a lot of layer shuffling); and there's no grabber hand for moving the page view around. The new Live Scroll Bars help some (the page moves as you move the scroll bar), but not diagonally.

Making Pages

The Master Pages feature (previously called Default Pages) has been revamped to allow for up to 127 master pages per document. You can use any master page for any document page. Changes to master pages now retroactively adjust pages created previously, but there is an option that makes retroactive adjustments ignore elements that you've changed locally.



QX Page Layout
QuarkXPress 3.0 offers free rotation, polygonal picture boxes, automatic drop caps, and automatic trapping of QuarkXPress-created color elements. The Document Layout Palette lets you move pages around within the document and build multipage spreads.

The Document Layout palette makes manipulating pages within a document a breeze. You can add, delete, or move pages within a document by dragging icons around (see "QX Page Layout"). Page spreads of two or more pages are easy to create, and items such as pictures, rules, or text boxes can straddle pages.

The new Library feature lets you store up to 2000 commonly used page elements (or sets of multiple elements, grouped or ungrouped) in a library file (see "QX Library"). You move the library entries in and out by dragging, or by cutting and pasting. You can label each element, and choose which groupings to view with a pop-up menu (for example, you could have everything with the name Sidebar appear in a scrolling list).

Text and Type

QuarkXPress's capable spelling checker and search-and-replace function now work globally, so you can search, replace, or check an entire document. The program is too cumbersome to be an effective word processor, however (you can't scroll through a document), so don't expect to do more than light editing and copy processing.

Typesetters and professional publishers have long favored QuarkXPress for its powerful typographics, including its ability to render Type 3 PostScript fonts on screen (what ATM does for Type 1 fonts). Now, along with added precision (to .001 of a point or .005 of an em for most measurements), comes the ability to create automatic drop caps of any size. You just specify the number of characters to drop, and the number of lines to drop them.

Also new is the ability to align text within a text box at the top, center, or bottom, or justify it vertically—adding space between paragraphs to make the text fit the box. You can specify the maximum spacing between paragraphs, but can't specify different maximum values for different paragraphs (or paragraph styles), which makes the feature much less useful.

Version 3.0 provides increased control over widows and orphans; keeping lines and paragraphs together;

(continues)

CLAIMS VS. ACCLAIMS

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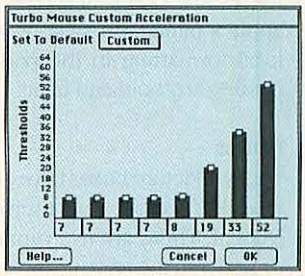

What's more, Turbo Mouse has unique software that lets you adjust both acceleration and double-click speed to exactly match the way you work. Move the ball slowly and the cursor moves pixel-by-pixel. Move it fast and it speeds across even the biggest screen.

The next time you read another claim for a trackball, remember the one that has earned all the acclaims. Turbo Mouse.

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QX Library

Libraries can contain up to 2000 entries, and each can contain multiple items. You can attach a one-line description to each item, and optionally see only those entries with a given description.

and style types, such as the particular scaling ratios for small caps, super- and subscripts, and superior type (a document-level preference). However, the most awaited new feature is the free rotation of text boxes to .1 of a degree.

There is one key failing remaining in the area of text and type: when you apply a paragraph style, it removes all local formatting in the paragraph, including any bold and italic.

Pictures

Quark's Picture boxes have always been round or square; now they can be polygonal. There are five canned shapes, or use a shape of your own (sorry, still no bezier curves). There's free rotation of pictures (independent of the boxes containing them), horizontal skewing, and scaling to .1 of a percent in either direction. Also new is the ability to greek pictures, precisely set the offset of an image (where the picture falls in the picture box), and check what pictures are in a document.

QuarkXPress can automatically check for and reimport pictures that have been modified externally (with an option to check with you first). Another great improvement is the separation of the transparency and the text-run-around options; you can now have transparent or opaque boxes, with run-around or without.

You can now specify paragraph rules above and/or below paragraphs, and the rules move with the paragraph. You can insert floating boxes (for text and/or graphics) that move just like any other character in the text, but that can hold any element or group of elements.

Support for Color

QuarkXPress has had the ability to generate process separations of its color pages, including color EPS graphics but not including color bitmaps. Version 3.0 adds the ability to create *traps* (slight overprinting areas that prevent white lines from appearing between abutting colors), either automatically or according to your specifications. Quark's trapping only works for QuarkXPress type and graphics, though (you have to trap EPS graphics in their source programs), and only for objects that overlap completely (partially overlapped objects are not trapped).

QuarkXPress 3.0 can produce full-color page separations that include color TIFF images using Pre-Press Technologies' SpectraSeps QX or by separating the TIFFs in advance into DCS (Desktop Color Separation) files with programs like Adobe's Photoshop or Pre-Press Technologies' SpectraPrint.

Reliability and Documentation

Quark was not nicknamed Quirk for nothing: each upgrade has gone through several versions before ironing out all the bugs. This time is no different; it's pretty easy to crash the program. Quark always comes through and fixes its mistakes; it just takes time.

Also somewhat quirky are the program's three manuals. The documentation still doesn't help you find a quick answer to a problem. Most of the answers are there, but they're scattered throughout the books. And some important issues, such as how to do color separations of color TIFFs, are not even touched.

Running QuarkXPress 3.0 on an SE is a painful experience (just selecting a box can take up to ten seconds). Definitely plan to use an SE/30 or II-level machine.

One last note: the installer program creates a registration disk for you, that you then send in to register the product. Also, when you launch QuarkXPress the program checks your AppleTalk network to see if another copy of the same program (same serial number) is running. If one is, yours refuses to run. Though it's hard to fault Quark on an ethical level for this tactic, it can be a real headache for system managers in large workgroups.

QuarkXPress or PageMaker?

So should you buy QuarkXPress 3.0 instead of PageMaker 4.0? PageMaker has some important user-interface niceties that are sadly lacking in QuarkXPress, but aside from indexing and table of contents generation, QuarkXPress's feature list far outshines PageMaker's.

If you consider other factors, though, you have to think twice. PageMaker, at least for the time being, has a much larger infrastructure of consultants, temporary workers, books, articles, tech support, and—this counts for many people—a PC version of 4.0 shipping this fall. So it's your choice: PageMaker has the solid, reliable underpinnings, but if you're a pro, you know where you're going, and you want to get there fast, QuarkXPress is definitely this month's hot choice.

—David Blatner and Steve Roth

See* Where to Buy *or circle 858 on reader service card.

Thermal Color Printer

PHASER PX COLOR PRINTER

Pros: Good price; uses serial, parallel, and AppleTalk interfaces simultaneously; excellent support materials. **Cons:** Smaller print area than LaserWriter's; images must be dithered to display more than seven colors. **Company:** Tektronix. **Requires:** Mac Plus or any Mac that supports color PostScript; System 6.0.2.; Apple LaserWriter driver 6.0. **List price:** 6MB version $7995, upgrade to 10MB version $1495.

A couple of years ago, when PostScript color printers first appeared, they were costing close to $25,000. Since that time, prices have fallen steadily. And now, at $7995, Tektronix's Phaser PX still doesn't sell

(continues)

"What's in a name?"

Everything, If You're in the

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The award-winning **Nova**™ Series includes MacUser Labs ★★★★★ rated 40 and 80MB drives ("Best of 101 Hard Drives," Feb. 1990) and has been expanded to include *new,* higher performance models with capacities up to 1.2 Gigabytes.

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Market for Mass Storage.

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Beyond magnetic storage, optical technology provides the benefits of prolonged data integrity in a compact, high capacity medium. Ideal for applications such as DTP, CAD/CAM, and multimedia production, the Microtech OR650 rewritable optical drive offers a "leading combination of price and performance" (*Macworld*, March 1990).

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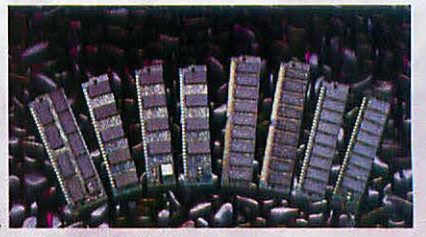
Tape Backup — "Standouts" (*Macworld*, Dec. 1989)

While everyone knows the importance of backup, most backup systems are just too difficult and time consuming. Microtech systems are easy to use and provide for fast protection of your valuable data.

Our T150 Tape Backup System was identified as a "standout" by *Macworld* magazine. And for larger capacity needs, Microtech now offers the *new* T1200 Digital Audio Tape unit with 1200MB of storage.

Both the T150 and T1200 come with Total Recall software, that handles a wide range of backup functions, even backing up an entire network, automatically and unattended.

Memory — *Macworld* Best Seller List



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for pocket change, but it opens up color printing to a much larger market.

Phaser PX Installation

Installing the Phaser PX is remarkably simple, thanks to Tektronix's excellent support materials. Instead of the usual small manual with miniature drawings, Tektronix provides a large poster that guides you in the installation process from unpacking, through paper and ribbon loading, to cable installation and switch setting. Also included is a conventional manual and disks with diagnostic images, a printer driver, utilities, and screen fonts for both Macs and IBM-compatible PCs—a nice change from those PostScript printers that require users to obtain screen fonts and drivers from other sources. The package also includes an informative book, *Picture Perfect: Color Output for Computer Graphics,* which gives general information on color-printer technologies and techniques for producing quality color graphics.

The Phaser PX uses the same AppleTalk interface that Apple LaserWriters use. In addition, it has serial and parallel interfaces for other types of computers. Some printers that offer multiple interfaces require that you manually select the interface from the printer's front panel. The Phaser PX keeps all three interfaces active all the time. It services print requests on a first-come-first-served basis, a boon for Mac and non-AppleTalk–equipped PC installations that share the printer. It also emulates the Hewlett-Packard 7475A plotter, using the HP-GL language, though this is likely to be of interest only to users of IBM PCs and compatibles.

Printing with the Phaser PX

There is one hitch though. The Phaser PX attaches exactly like a LaserWriter, but the print area of the Phaser PX is quite a bit smaller than the LaserWriter's. Thermal-wax-transfer printers typically require large top and bottom margins on each sheet in order to grip the page during the printing process. Version 6.0 of the LaserWriter driver supports page sizes only for LaserWriters. Using this Apple-supplied driver results in images with portions of the top or bottom missing. Tektronix supplies a LaserWriter 6.0 driver with the Phaser PX that includes special page sizes for color printers. Although the documentation is not clear on this point, you *must* use the patched driver to get satisfactory operation. The Apple driver defaults to US Letter, a paper size not supported by the Phaser PX. You can use the pop-up menu to select a new paper size.

The Phaser PX, like other PostScript color printers, does a creditable job of printing regular black text. Before deciding that it can replace a LaserWriter, however, you should consider the reduced print area. When printing on standard 8.5-by-11-inch paper the Phaser PX can only print an image 8.13 by 8.48 inches. To print a full page it's necessary to print on legal-size paper (8.5 by 14 inch) and trim the top and bottom margins off the resulting 8.13-by-10.83-inch image. Text and other solid black areas come out dense and dark, generally better than laser-printer output. But black-and-white patterns, or halftones printed with the three-color ribbon, often have a sepia cast. Thermal-wax-transfer printers also require special, coated paper for best results; they cannot print on plain bond paper. The Phaser PX prints on transparency film and produces excellent full-color overhead presentations.

Thermal-wax-transfer printers like the Phaser PX characteristically have a fixed dot size and color density. The printer's resolution is 300 dots per inch, but each dot can be one of only seven colors: yellow, magenta, cyan, red, green, blue, or black. In order to show more colors, the PostScript interpreter assigns different colors to dots in a group. The eye perceives the group of dots as a single intermediate color. This dithering process increases the color range at the expense of effective resolution. Still, the resolution of the Phaser PX's full-color images is generally acceptable for small runs and proofs. It does support the Pantone Matching System when used with Pantone-compatible applications.

Cloning Around

Instead of a true Adobe PostScript interpreter, Tektronix uses a PostScript clone. It includes replicas of the type families available on the LaserWriter II family of printers and supports downloaded Type 1 (Adobe) and Type 3 (third party) typefaces. I didn't uncover any significant differences between the operation of the clone interpreter and Adobe's interpreter, but I did find differences in the included typefaces. For example, adjacent em dashes in some Adobe typefaces form a solid line, while the same text printed on the Phaser PX prints as a dashed line. If you own ATM and Adobe Plus Pack, you can guarantee LaserWriter compatibility by downloading the Adobe font families to the printer. Downloading takes time, however, and uses up printer memory. Furthermore, you must repeat the download whenever you restart the printer. The interpreter performs quite well, owing, no doubt, to the Phaser PX's 68020 processor and 6MB (expandable to 10MB) of RAM.

The Phaser PX is a solid, easy-to-use color printer that's reasonably priced. It can't completely replace a laser printer, but it does bring color PostScript–compatible output within the range of a small office.—**Ron Risley**

See* Where to Buy *or circle 848 on reader service card.

JOHN GREENLEIGH

Phaser PX Color Printer from Tektronix

24-bit Color Paint Program

COLOR MACCHEESE 1.04

Pros: Simple; cheap; offers a good selection of basic tools and effects. **Cons:** Can't create custom color palette; difficult to create custom patterns. **Company:** Delta Tao Software. **Requires:** Mac II; color monitor; 24-bit graphics board if 24-bit color desired. **List price:** Version 1.05 $99.

Upscale it's not. Color MacCheese comes in a hand-painted box that contains a single disk and a 50-page manual. But what do you want for $99? If what you want is a functional, no-frills, inexpensive 24-bit paint program, you'll probably be pleased with Color MacCheese. If you want tools galore, a wealth of customization options, and fancy features like object masking and color separations, you should buy the competition, SuperMac's $699 PixelPaint Professional.

What It Has

Color MacCheese is a simple program, but that's part of its charm. It passed my dive-in-and-use-it-before-reading-the-manual test with flying colors, thanks in part to a help window that describes each tool or menu item as the pointer alights on it. The tools themselves are pretty straightforward; the program includes a pencil for drawing pixel-wide lines, a brush for wider lines, an eyedropper for picking up colors, a paint bucket for filling areas with color (including linear or radial gradient fills), a water drop for smoothing edges, various shape tools, a text tool, an eraser, a line tool, and a spray can. Two tool icons, the rake and the transmogrifier, had me stymied at first, but the help window informed me that the former scatters pixels to break up sharp edges and the latter adds texture to an area by spraying dots of similar colors. The program's basic components are shown in "A Slice of Color MacCheese."

Other tools include a lasso and marquee for selecting areas, a magnifier, a transparent/opaque tool, and an antialiasing tool for softening the edges of angled lines. The Handy Palette offers a choice of 23 fixed colors, while the program's Color Wheel lets you visually pick any of 16 million available colors by clicking on a circle to select a basic color and dragging a bar to set its brightness. Traditionalists can use Apple's Color Picker, which offers click-and-drag color selection as well as the ability to type in values for hue/saturation/brightness or red/green/blue. A pattern palette completes the tool picture, allowing you to scroll through a series of preset patterns that apply to brushes and filled areas.

Color MacCheese's menus are minimal. In addition to the standard Apple, File, and Edit menus, the program offers only three: the Window menu displays or hides selected windows and palettes; the Selections menu lets you perform operations such as Flip (180 degrees, horizontal or vertical), Rotate (90 degrees), and Erase Current Color on selected areas; and the Options menu lets you set things like the size of the work area, number of colors, and degree of transparency.

On the whole, the tools work well and offer enough customization options to be useful. The brush lags a bit and produces some jerky, angled lines rather than smooth ones when you move it quickly, but it is fine when you slow down. The interface is thoughtfully designed; for example, the magnification icon makes it easy to toggle in and out of the magnified view, and a keyboard shortcut changes most any tool into the eyedropper for quick color selection.

What It Hasn't

Color MacCheese can be excused for failing to provide deluxe features such as masking, color separation, on-screen color mixing, or the ability to rotate a selection by a given number of degrees. The program doesn't claim to be the latest word in features and special effects. (However, it does provide some relatively sophisticated features such as a background plane, antialiased text, translucent colors, and color dithering.)

I was somewhat disappointed, though, by the absence of a few features I consider fairly basic. For example, you can't create a custom brush in Color MacCheese (you can lasso an object, hold down the Option key, and drag it to paint, but that's a pretty cumbersome workaround). Similarly, you can't double-click on a pattern to edit it; you can select an area of a painting and add it to the pattern palette as a new pattern, but it's difficult to select an area that's the correct size (patterns that aren't the right size are shrunk or enlarged before being placed in the pattern palette).

The spray can is nothing to write home about (but then, few people are inclined to write home about software tools, so this is probably a moot criticism). It sprays in a square pattern, which shatters any analogy to a real can of spray paint, and lacks the finesse of spray paint sprayers I've seen in other programs.

My biggest disappointment with Color MacCheese was the fact that I couldn't construct a custom color palette. The Color Wheel makes it easy enough to select colors, but once you move on to another color the previous selection is history. Of course, you can use the eyedropper to select any color in a painting, but I prefer PixelPaint

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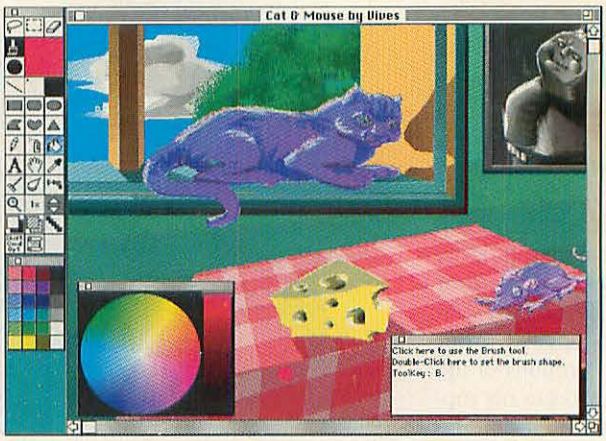

A Slice of Color MacCheese
Delta Tao's Color MacCheese offers all the tools you expect to find in a color paint program, plus a help window that describes their functions.

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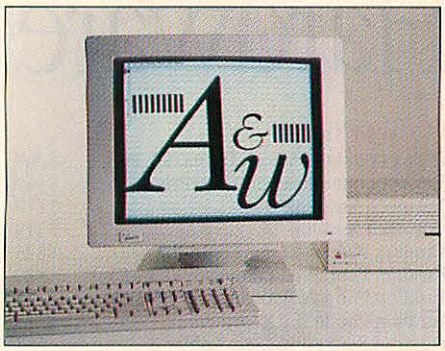

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News, Views, & Product Tips

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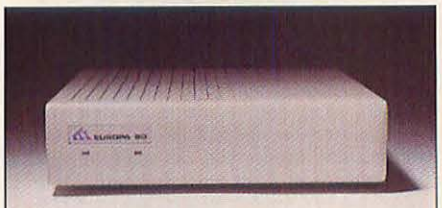

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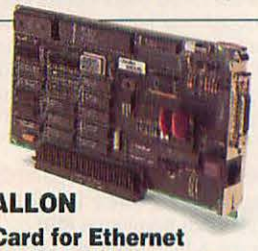

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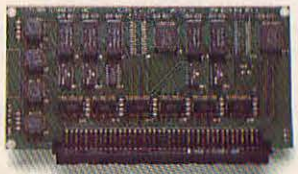

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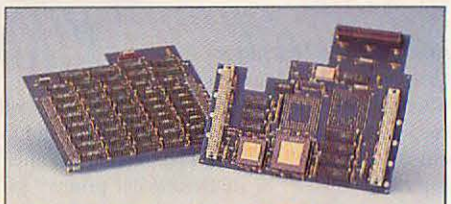

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Pro's pop-up color palettes.

Another attribute that's missing from Color MacCheese is a voluminous manual. This shortcoming is actually a plus in my book. The tiny manual's simple, lighthearted style, combined with the program's relative simplicity, make Color MacCheese a breeze to learn.

After you've dished out the thousands of dollars necessary for a Mac II, color board and monitor, and possibly a color printer, it might seem strange to spend only $100 on a paint program—like spending $500,000 on a house and buying your furnishings at K mart. (Then again, after you've made a few mortgage payments, you might have to get all your accessories at Kmart.) But Color MacCheese is a good little program. If you're a serious artist, you'll probably want to invest in the feature-filled PixelPaint Professional. But if you're a whimsical artist, or simply someone who wants a decent 24-bit color paint program and doesn't mind saving $600 or so, then I suggest Color MacCheese for you.

— Erfert Fenton

See **Where to Buy** *or circle 735 on reader service card.*

Ecological Simulation Game

BALANCE OF THE PLANET 1.0

Pros: Contains some interesting ecological information in a HyperCard stack. **Cons:** Uninteresting interface; too little information on how the simulation works; restricts the player to a medium-term view of no more than 45 years for the entire game. **Company:** Accolade. **Requires:** Mac Plus; hard disk. **List price:** $49.95.

Intended as a learning tool for adults, Balance of the Planet is an ecological-simulation game with the player cast in the role of a UN administrator responsible for improving the ecology by levying taxes on polluting industries and setting subsidies for energy research, family planning, and other programs.

Balance of the Planet has three levels of play. Level One, the main interface to the game, is essentially a spreadsheet where you click on various tax or subsidy items. You are then

The Spreadsheet of Eden

From the Policy Summary screen you click on a tax or subsidy you wish to increase or decrease.

shown a screen (the Beef Tax screen, for example) where you drag a slide bar to raise or lower a tax or subsidy. After all the variables are set, you select Execute Policies from the Game menu. Suddenly it's five years later and you go to the Results screen to find out the effects of your policies. Usually the results are rather grim. Chris Crawford, the designer of both this program and the popular Balance of Power, notes in the manual that it is difficult to "win" the game at the Level One stage due to the state the world is already in. After some experimentation (be sure to tax those evil CFCs to the max!) you'll get some improvements in the state of the ecology, but you'll most likely get the soul-shivering message that millions have starved to death during your administration.

Button, Button, That's Not the Button

After you've experimented for a while and failed miserably, you'll want to explore the HyperCard stack that describes many of the planet's problems. Although the individual cards have a pleasing appearance, with color borders showing interrelated scenes from nature, the scenes themselves and the arrows pointing from one scene to another were confusing, because I expected them to be HyperCard buttons but they are simply illustrations. None of the small square illustrations are buttons, and there is no "click on text" instruction to tell you that the text fields are the only buttons.

After I finally found the cards that explain the various ecological relations, I thought, "Oh, here's all the information on how the taxes and subsidies work, and how the parts of the simulated ecology affect each other." Not so. Each card discusses a pollutant, an industry, or a species, but typically doesn't help you understand how the simulation really works. For instance, does the subsidy category Nuclear Research mean research on building higher-capacity power plants, on making weapons, or on cleaning up nuclear waste? All of these require nuclear research. The problem is, you don't know whether you are subsidizing research on safety, efficiency, weapons, or all of the above. When you get to the card that explains nuclear technology, it explains some of the benefits and detriments of nuclear energy but doesn't say anything about how your research dollars are being used. Surely if you were the UN administrator responsible for saving the planet you would have access to that information. The same lack of information exists with the other energy-research subsidies, although several of the other subsidies (for example, Debt for Nature) are well explained.

The most obvious way to find out the gross effects of any one of the more than 20 variables is just to slog it out with the empirical method: change only one variable to its maximum value, step through all nine stages of the game, note the results, start over, change the same variable to its minimum value, and repeat the process. Although it might work, this is too much like backing up your hard disk.

Balance of the Planet has two other levels of play. At Level Two you can set the game to run using one of the four different world biases: Industrialist, ProNuclear, Environmentalist, and ThirdWorld.

The Industrialist bias is easy to win because the basic assumption is that there is "really no problem, it's just a matter of fine-tuning." The ProNuclear bias simulates a world in which nuclear power is essentially safe. The Environmentalist bias is extremely difficult to win because of the seriousness and multiplexity of problems challenging the environment. The ThirdWorld bias puts the greatest value on preventing starvation anywhere in the world. At Level 3, you can create your own biases and save them.

The World Turned Upside-Down

I found it strange that Balance of the Planet lets you alter reality in some

(continues)

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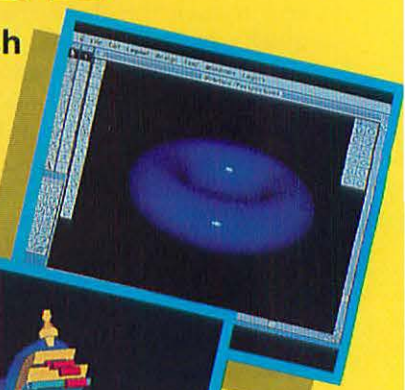

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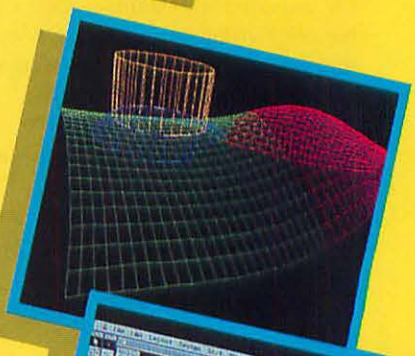

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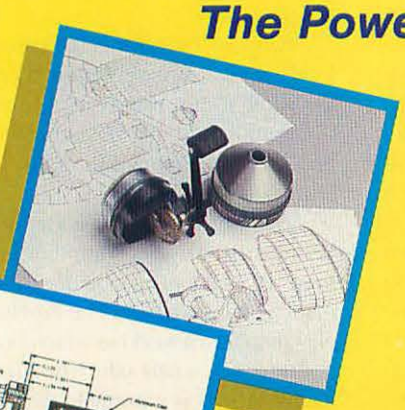

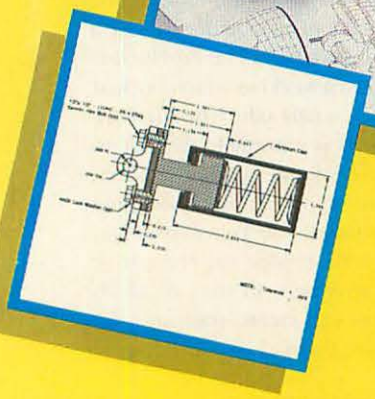

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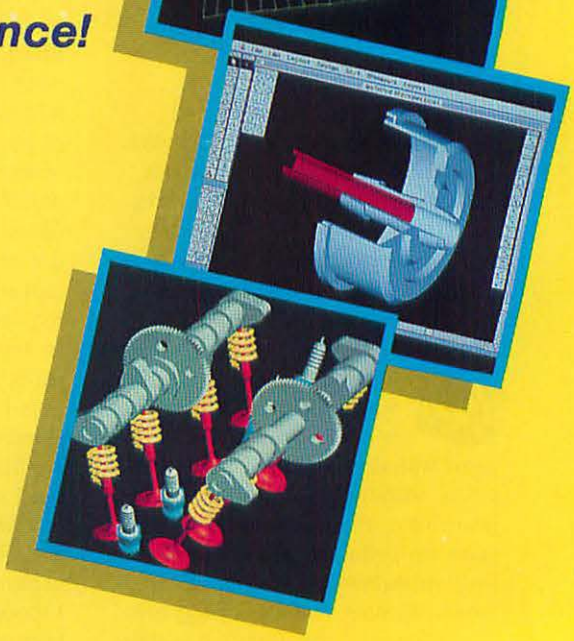

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unrealistic ways, but prevents you from taking a longer-term point of view. That means you can change reality so that coal smoke is not a problem, but you can't look at the really long-term results of your policies because the game always ends after nine turns that represent a total of 45 years.

But I think the main problem with Balance of the Planet is that, one way or another, it will fail to hold the interest of all but a few players. Crawford states in his introduction to the user's manual that the game was not designed for children, and it is certain that very few children would remain interested in the spreadsheetlike screen. Unfortunately, adults too will find the game and its limited interface boring and unnecessarily difficult to understand. And most of the pure ecological information is not new to anyone who reads a newspaper regularly. It is also easy to lose track of your original destination while navigating through the highly interrelated topics in the HyperCard stack.

Ultimately, trying to "play" Balance of the Planet is like plowing through a mystery novel whose writer does not give the reader enough meaningful clues. You can identify the ecological villains immediately, but the whys and hows of the complex plot remain mostly unsolved. The many problems of the planet's ecology are expounded upon but not dynamically illustrated. The bottom line is that Balance of the Planet needed either a truly daunting amount of work in its design and execution or a less ambitious design with a better chance of achieving the goals of playability and edification.

—Tom Moran

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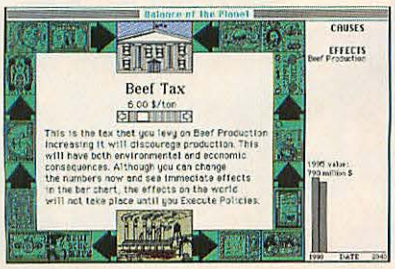

The Meat of the Matter

Using the slide bar you change the tax on beef production, which wastes a number of resources. Increasing the tax will save grain and pastureland, but may adversely affect the world economy.

Professional MIDI Sequencer

BEYOND 1.5

Pros: Flexible sequence chaining-and-layering functions and song-overview display with excellent graphic feedback; intelligent transposition and harmony-generating functions; superlative loop-recording functions. **Cons:** Not compatible with Apple MIDI Manager; no vertical zoom control in note-editor window; clumsy mouse control when editing numerical values. **Company:** Dr. T's Music Software. **Requires:** Mac Plus; second disk drive; MIDI instrument and interface. Hard disk recommended. **List price:** Version 1.6 $319.

Dr. T's new MIDI sequencer, Beyond, is entering a market dominated by three programs, each of which has a devoted group of users: Mark of the Unicorn's Performer, Passport Designs' Pro 4, and Opcode Systems' Vision. Beyond has many of the best-loved features of its competitors, with quite a few interesting refinements. And although it's a little rough around the edges, Beyond does have a few innovations of its own.

Familiar Ground

Beyond's layout looks a lot like that of Opcode's Vision sequencer; you can record up to 32 sections of music, each capable of holding 99 parallel tracks of data. With very flexible cue looping and a superlative loop-recording scheme, you can audition successive takes as you're recording and create sections extremely quickly. You can then insert an entire section, as a subsection, into a track, stringing sections end-to-end and layering them for simultaneous playback.

With the ability to play up to 16 subsections at once, each with 99 tracks, Beyond lets you chain together a series of short patterns to create the structure of a song, and then trigger other phrases at any point in the song, as well as record linear tracks that run the length of the entire piece. Beyond displays a chain of subsections graphically in the note-editing window, and lets you change the start time and length of a subsection by dragging handles on each section's icon (see "Beyond Editing").

While Vision and Performer both have similar abilities, Beyond has a couple of excellent features that they don't have, including a pop-up list of the subsections in a track. The track list and editing windows instantly display the contents of the subsection you chose, making it much easier to keep track of what's going on as you create a complex arrangement. By integrating the complex capabilities of Vision with the graphic displays of Performer, and adding the pop-up list, Dr. T's has made working with multiple subsections much easier. Although there is no provision for triggering or transposing subsections live from a MIDI instrument (as Vision can), Beyond is worth a look if assembling songs section by section is your style.

The track list window has a multitrack view mode, which shows an overview of the current section in graphic form. You can perform cut-and-paste editing from this window, made easier with adjustable zoom levels and cursor resolution controls. The other graphic editing displays in Beyond are similar to those found on the Big Three programs, with some notable refinements. In the note-editing window you can toggle the display of velocity stems, which are vertical lines extending upward from the left side of each note on the screen. The height of each velocity stem indicates the force with which that note was played, making it a simple matter to edit note velocities. These velocity stems provide an easier method of editing than Vision's strip chart, because the velocity display is attached to the note being edited, and each note within a chord can be edited individually; Vision's velocity display appears at the bottom of the note-editing window, and editing the velocity of one note affects all the notes in that chord.

In most other respects, Beyond's graphic editing display is at least the equal of its competitors. Unfortunately, the on-screen bars that represent notes are a little skinny, and there is no vertical zoom control, so the notes can be hard to grab with the mouse. A nice touch, however, is that if a track contains any pitch bend events, notes in the editor window bend to graphically show the pitch you'll hear.

(continues)

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Regional Selections

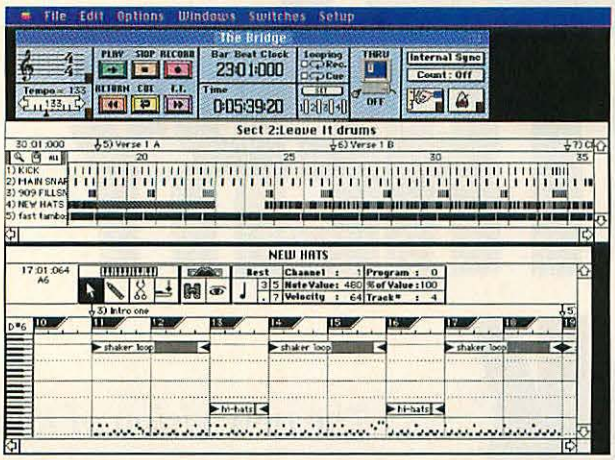
Selecting the region that will be affected by the editing commands is straightforward; you click and drag in different areas of the time ruler, which lies across the top of the editing window. The selected region's boundaries snap to measure or beat gridlines. Unfortunately, there is no way to select discontiguous regions with the mouse. You cannot, for example, select measures 3 through 9 and 12 through 14, which is an inconvenience. Beyond's selection filter partially makes up for this shortcoming by letting you use the rhythmic placement of the notes in any measure as a selection template; the program selects only the events that fall (or don't fall) within an adjustable window around those rhythmic locations. This lets you do things like select only the notes at the end of every measure, or only notes that occur at the same time as some other event. Passport's Pro 4 has a similar feature, but it forces you to manually specify what rhythmic locations you want the filter to apply to. Beyond's selection filter is simpler to set up, since you can just use an existing part as a template, but it would be nice if the template could be longer than one measure, which is the only length available.

Once you've selected the region of notes you want to manipulate, you can choose from a healthy complement of commands in the Edit and Options menus. The Human Feel command creates random fluctuations in note timing, duration, and velocity, and can also create subtle tempo changes; you can even control the tendency for Beyond to rush or drag the beat when it changes note timings, so that the results lean in the direction you want. The Transpose and Harmony commands can change music intelligently from one key to another and create up to four-part harmonies from a single part, and the harmonies can be automatically assigned to separate tracks for voicing on different instruments. There is also a Reverse command that can reverse the timing of events or flip the pitches of a track around a pivot note. My favorite feature is the Extract Data command, which can cut or copy data from a track based on the data's type, and can also remove notes that are not in a user-specified key. This lets you remove all of the duff notes in a performance with a single command.

Beyond is chock-full of this kind of subtle innovation, so it's a little annoying to find out that it's not compatible with Apple's System-level MIDI Manager driver, that it can't record from both serial ports at once, and that the only things displayed in color on a Mac II are the transport controls and the About Beyond dialog box. The manual is only adequate, with no list of ⌘-key equivalents and a slightly clumsy layout.

Despite these annoyances and a slightly unfinished look, Beyond is a robust program that shares many of its competitors' best features. Nevertheless, thanks to several major upgrades all three of them still feel a bit slicker and quicker than Beyond. In the end, Beyond really excels in loop recording and subsection chaining, so if that's the way you like to make music, then maybe you should go Beyond and check it out.—**Charles Clouser**

See **Where to Buy** *or circle 727 on reader service card.*



Beyond Editing
Beyond's note editor window (bottom) shows notes and subsections graphically. The multitrack view (middle) provides a graphic overview of a song. The Bridge (top) looks a little large and clunky on a 9-inch screen when blown up to its full size (as shown).

Word Puzzles

LETTERFORMS & ILLUSIONS 1.0

Pros: Good use of MacPaint; fun way to look at type design and word puzzles; instructions are well written and easy to understand. **Cons:** Dull; puzzles are not very challenging; you cannot save or print with provided demo copy of MacPaint. **Company:** W.H. Freeman and Company. **Requires:** Mac 128K. **List price:** $39.95.

Remember the day you found out that *dog* was *God* spelled backwards? It was probably one of the first word puzzles you ever encountered, and at the very least, it showed you that words can hide secrets that can be discovered if you take a second look.

Taking a second look at words and type is exactly the point of LetterForms & Illusions, a collection of word puzzles and trick fonts designed by puzzlesmiths Scott Kim and Robin Fe Samelson.

LetterForms & Illusions is a small collection of puzzles (the package says 40 but there are far fewer than that, unless you count multiple permutations of the same puzzle) and some have an impressive visual beauty. Kim and Samelson have created some specialty typefaces that can provide a few hours' worth of entertainment as you flip, bend, squeeze, and squish them into different patterns and shapes.

But after a while, the puzzles turn out to be about as much fun as watching Vanna White turn vowels over on "Wheel of Fortune."

MacPaint Gets Puzzled

The puzzles are designed to work hand-in-hand with MacPaint, and a demo copy of that program is included on the disk. The demo has the same selection of tools as the full version of MacPaint but does not allow you to save or print your files.

One of the best features of LetterForms & Illusions is the Flips DA, a series of special MacPaint commands that let you flip words and objects vertically, horizontally, or diagonally, as

(continues)

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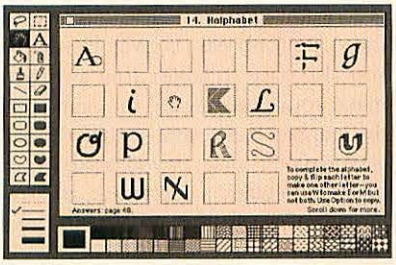


Halphabet Soup
Puzzles such as Halphabet, shown here, challenge the user to flip letters and words to make sense out of jumbled phrases.

well as rotate them in 90-degree increments. The Flips DA is a useful shortcut for anyone using MacPaint; you can transport it to your own version of MacPaint using Font/DA mover.

Four Folders to Flip Over

The program is divided into four folders: Tutorial, Flips Puzzles, Font Puzzles, and Kits, a collection of inversions from Scott Kim's book *Inversions,* in which he devised typefaces that could be read in different directions.

The tutorial is a brief introduction to using MacPaint to solve LetterForms & Illusions' puzzles that is clearly written and easy to understand. It teaches you the simple MacPaint commands, such as lassoing and flipping, that you will use in the puzzle files in the other three folders.

The first puzzles you encounter if you follow the company's recommended order are called Flips Puzzles. They are the closest thing to a game in LetterForms & Illusions, the main purpose being to take phrases that have been jumbled and flip the words around until you unscramble the phrase.

The drawback is that once you get the hang of flipping words, the thrill goes out of the chase. You have as much time as you want, and can just keep flipping words around until you get the answer. Surely the authors could have spiced up this potentially engaging game by adding a time limit, or limiting the number of moves to complete the puzzle, or adding some sort of scoring feature.

Is M. C. Escher Your Type?

The next folder, Font Puzzles, consists of ten fonts created by the authors. Some of these fonts are genuinely engaging—for example, the Escher font designed from the type style found in the mesmerizing patterns of Dutch artist M. C. Escher. The patterns and pinwheels you can create with Escher are reminiscent of the great artist's drawings, and show the flexibility, power, and versatility of a well-designed font.

Other fonts put the special features of MacPaint to good use as well—for example, a font called Illusion, made up of evenly spaced white and black stripes, is perfect for creating special effects and puns. Following the authors' instructions, you can create special effects with illusion such as fade-outs, waves, circular letter forms, and other kinds of visual tricks.

But while a few of the ten fonts are interesting, more often the ideas seemed half-baked. Here's an example: the font named Boxes replaces each letter of the alphabet with a black box, the box being the same size and depth as the character it replaces. You're supposed to guess at the word being typed, by looking at the string of boxes. Big fun.

Here's another. The font named Close-up types only parts of letters. You're supposed to look at the jumble of shapes on the screen and decipher the word—or, if that's too much excitement, you can type the same letter endlessly to form patterns.

The Real Puzzle Is: Why Play It?

In Kits, the last folder, not becoming bored by the repetition of the steps is the biggest challenge. Kits is made up of fonts and designs from *Inversions,* in which letters are designed to be legible when seen in different ways: upside-down, backwards, sideways, or as if held up to a mirror. The puzzle here is to re-create designs from the book by using the fonts provided. It deserves a glance. A quick glance.

The authors seem to think that you'll get hours of enjoyment out of fiddling with their fonts and puzzles. Ultimately, though, the real puzzle of this program is trying to figure out why anyone would want to spend the time and money to use LetterForms & Illusions for any longer than the hour or so it takes to familiarize oneself with the program.

—Michael Dashe

See* Where to Buy *or circle 806 on reader service card.

Golf Game

JACK NICKLAUS' GREATEST 18 HOLES OF MAJOR CHAMPIONSHIP GOLF

Pros: Exceptionally well designed and realistic graphics; good simulation of real golf action; accurate maps of real-life golf courses around the world. **Cons:** Difficult to recognize course objects in the black-and-white version; irritating copy-protection scheme. **Company:** Accolade. **Requires:** Mac Plus. **List price:** $59.95.

Jack Nicklaus, a living legend on the golf links, has linked his name to one of the best computer sports games on the market. Simply put, Jack Nicklaus' Greatest 18 Holes of Major Championship Golf is a masterpiece. It has it all: great graphics, realistic game play, and a nonstop supply of golf courses from around the world. Whether you're a rabid golf fan or you don't know a birdie from a hole in the ground, you're bound to be hooked by this thoughtful, well-designed game.

Art Imitates Life

The secret of the success of Jack Nicklaus' Greatest 18 Holes of Major Championship Golf is that Accolade has designed the game around some of the world's best golf links. Everything is presented just as if you're actually playing through the course: the obstacles, the doglegs, the sand traps and lakes, in fact all of the idiosyncrasies that make each course unique and challenging. Even the clubhouses and grandstands of some of the most famous courses are included.

Where the game really excels is in the graphics—at least for the color version of the game. The scenery is realistic, from the trees that line the course, to the lakes and sand that form the obstacles, to the buildings in the distance. When you swing, the animation of your computer alter ego is superb: your body twists, your follow-through is impeccable. You end up wishing you really could hit a golf ball like that. Once you've hit the ball, the visuals keep the action realistic—the ball casts a shadow

(continues)

as it flies, and makes a spurt of sand fly when you hit it into a sand trap. The ball makes a satisfying *plop* when you slice into a lake—and believe me, you will slice into a lake before you've learned to master this game.

Choices Galore

You have an impressive series of choices to make before you start. First, you select one of three courses, the primary one being Jack Nicklaus's fantasy golf course: a single course made up of individual holes from nine major championship courses, including Pebble Beach and Baltusrol. The other two courses were designed (in real life, not just for the computer screen) by Nicklaus himself: Castle Pines and Desert Mountain.

After the course selection comes one of the few drawbacks to the game: a copy-protection scheme that's guaranteed to make your eyes bug out and give you a headache. You're given a piece of paper (photocopy-proof red) with over 50 tiny maps of golf holes. A hole randomly appears on screen; you've got to pick the corresponding hole on the map before you can continue. The trouble is, lots of the holes look almost the same, and you find yourself squinting at itsy-bitsy details of the maps trying to figure out the right one. Two strikes and you're out: Jack tells you it looks like rain and bumps you out of the program.

Anyway, once you can focus again, you select up to four golf partners, either preprogrammed computer players, or human players. The nine preprogrammed computer players come in all flavors—from Jack Nicklaus himself (I warn you, he hits almost every shot perfectly) to female pro golfers, gifted amateurs, and an incompetent Sunday player named Curly. You select the level of each human player, either beginning or expert, and the sex (female players hit the ball less powerfully and therefore have tees slightly closer to the pin).

Strokes or Skins

One of the more interesting aspects of the game is deciding the type of competition on the course. You can choose to play for lowest score (stroke play) or for a winner-takes-all dollar amount per hole (skins play).

Each hole starts out with a description and a tip from Nicklaus on how to play it. He tells you what obstacles to look out for, or suggests the best way to position the ball through the course. It's a good gimmick—you really feel as if you're getting a quick (albeit superficial) lesson on the ins and outs of the course from someone who knows the course intimately.

The Play's the Thing

You start out with a bird's-eye view of the hole, to plot your approach strategy; then you're at the tee. Beginning players have their clubs automatically chosen for them; expert players get to choose their clubs at every hole. Each club has a maximum distance rating for a perfect swing, but if you hook or slice, the distance can be much less.

There are more than enough variables in the game to keep it interesting. First of all, the wind factor is constantly changing. You have to compensate by changing the direction in which you hit the ball, or intentionally hooking or slicing in a direction that counteracts the wind. On the putting green, the direction and steepness of the slope (or break) is given to you, so you also have to adjust your swing to make your putts. Again, the realism of the graphics is excellent—when the ball is blown off course, or you make a putt on a particularly steep break, the trajectory of the ball looks like the real thing.

Swinging your club and hitting the ball is a talent that takes some practice. Each swing requires three perfectly timed taps of the mouse button: one to start your backswing, one to determine distance, and one to begin your downswing. If you don't time it perfectly, you either hook, slice, or change the distance the ball travels. But with a little practice it gets to be second nature. The skill in the game is to take into account all these variables—wind, distance, slope, and obstacles—and also hit the ball perfectly. Nicklaus can do it. Most of the time, you can't.

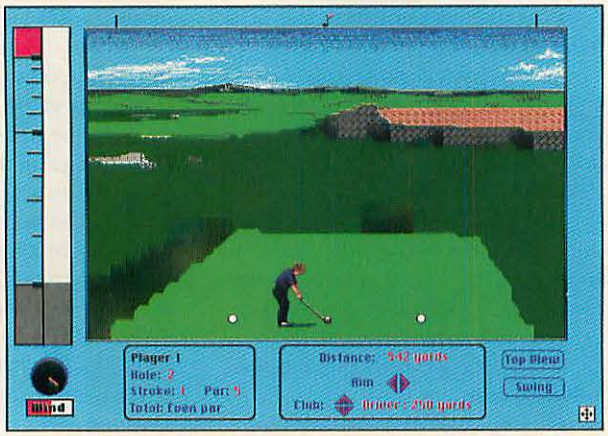
International Intrigue

One of the things I like most about this game is that its possibilities are as endless as the number of golf courses in the world. The publisher has already released two supplementary programs that feature new courses. The first, Jack Nicklaus Presents The International Course Disk, features championship courses from Australia, Japan, and England. The second, Jack Nicklaus Presents The Major Championship Courses of 1989, is made up of the courses that the U.S. Open, the British Open, and the PGA Championship were played on in 1989: Oak Hill, Royal Troon, and Kemper Lakes.

With such great graphics, it's a shame to play these games on a black-and-white monitor. You can't really get the full beauty of the landscape, and, in fact, I found the black-and-white approximations of the rough, lakes, and sand traps to be difficult to decipher.

But really, these criticisms are minor points when compared to the excellent overall design, pleasurable play, and great graphics that make up this computerized golf world. It's the next best thing to being out on the greens—but in this computerized golf world, you can play on the golf course with Jack Nicklaus—and with a bit of luck, you can win.—**Michael Dashe**

See **Where to Buy** *or circle 804 on reader service card.*



Expert Advice
Nicklaus himself warns you that this hole, the 14th at St. Andrews, is the most dangerous tee shot in all of golf.

Pascal Programming System

THINK PASCAL 3.0

Pros: Fast Pascal compiler with object extensions, class library, and MacApp support. **Cons:** None. **Company:** Symantec Corporation. **Requires:** Mac Plus; hard disk; 2MB RAM for use of class library. 4MB RAM for MacApp recommended. **List price:** $249.

Earlier versions of this program (called, variously, Lightspeed Pascal and Think's Lightspeed Pascal) were already outstanding products, noted for fast compilation speed and a slick Project facility. Because Pascal is a natural choice for a Macintosh programming language (it was the best-supported language for the Lisa before the Mac), much commercial software is developed in Pascal, unlike in the UNIX or DOS-based markets, where the triumph of C is nearly complete. This newest version of Think Pascal assures a continuing bright future for Pascal on the Mac. Besides modest improvements in compiling speed, improved debugging, and better compatibility with Apple's programming products, Think Pascal 3.0 is the first Mac product to offer a reasonably priced introduction to object-oriented Pascal programming.

A Trip to the Library

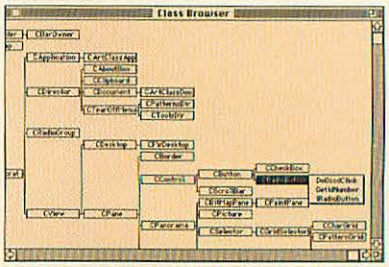
The motivation in object-oriented programming (OOP) is the logical reluctance to reinvent the wheel (for more information about OOP, see "Object-Oriented Programming," *Macworld*, January 1990). In Mac programming, for instance, a prime example of a wheel is the resizable window with scroll bars, found in most applications. Although to end users such a window is so commonplace as to be nearly boring, it's far from boring—a challenge, in fact—to construct one in an application from basic ROM toolbox calls in standard Pascal or C. In OOP, there is a class library that performs that very task. A class library serves as a sort of software supertoolbox, with each class capable of performing a specific programming task. In Think Pascal, the classes in the library are devoted mostly to handling Mac interface tasks (establishing menus, putting buttons and picture fields on screen, manipulating files), and the classes are actually very easy to find and use.

This is not a trivial point. There are many ways to partition software tasks and define classes, and Think Pascal has chosen to employ smaller classes, expecting that these will be easier for object-oriented–programming newcomers to master. Given that the entire universe of really experienced OOP programmers consists of a few thousand people—Smalltalk pioneers from Xerox, C++ gurus at Bell Labs and elsewhere, and MacApp hotshots—most of the market for this product may be safely supposed to consist of newcomers. One spectacular feature that will bring these people up to speed quickly is the Class Browser, a facility for rapid inspection of classes and their relationships, and the methods that operate on these classes (see "Class Act"). With the Class Browser you can easily poke around in the library investigating classes and their functions; it's remarkable to find this level of OOP convenience in what's basically a modified procedural language (as opposed to a real, from-the-ground-up OOP language such as Smalltalk). Click on a class, hold down the mouse button, and see the methods that operate on that class.

It's not only convenient but also necessary that you should have this kind of easy access to the Think Class Library, for the slightly unpleasant reason that you will be largely self-taught in Pascal OOP. The Think Pascal OOP manual devotes a bare 44 pages to an introduction to this nonobvious topic before proceeding to a swift and plain description of the elements of the library, and there is not yet a third-party book available about this specific product version.

MacApplications

This, however, won't discourage one set of users: experienced MacApp developers who are looking for a snappier programming environment. Think Pascal provides a source-code converter so that files for MacApp, the original MPW generic application framework, can be used inside Symantec's program. The old MPW resource tools Rez, DeRez, and PostRez now appear inside Think (as SARez, SADeRez, and SAPostRez), and seed projects are provided to get your MacApp-based application up and running inside the Think Pascal environment. As a further concession to MPW traditions, Think Pascal can be set to detect Projector resources; this lets Think Pascal programmers work with groups using the superior source-code-control facility Projector. Since the compile-and-link cycle in Think is two to four times faster than MPW's, Symantec has made it possible for programmers who already have Apple's advanced tools for OOP programming (you have to buy MacApp separately from Apple) on the Macintosh to get really valuable improvements in project turnaround time.



Class Act

The Class Browser is not only the best way to navigate the class structure, it's also essential for introducing beginners to the efficient use of object-oriented programming. This example shows the three methods (an unusually small number) that act on the class CRadioButton.

Think About It

There are a few other feature upgrades: Lightsbug, the already fine source-level debugger now has object support; commands have been added for stepping into or around functions during debug; the menus are now more in accord with usual Macintosh practice. The core compiler has barely been changed except to allow more program segmentation options, but by version 2.0 the compiler was already formidable. Think Pascal is a complete program-development system for the Mac, with a clean and well-planned class library for object extensions to standard Pascal, at a heartwarmingly reasonable price. Perhaps once a year a product appears with no obvious room for improvement; Think Pascal 3.0 is that product for 1990.—**Charles Seiter**

See **Where to Buy** *or circle 886 on reader service card.*

Precision Drawing Tools for MacDraw II

DRAWTOOLS 1.0

Pros: Adds features of high-end CAD programs to MacDraw II; inexpensive.
Cons: Sizer is slow to open; MacDraw II's Undo command doesn't undo DrawTools' changes. **Company:** Paracomp.
Requires: Mac Plus; System 6.0; MacDraw II. Hard disk recommended.
List price: $99.95.

Paracomp bills its DrawTools as a bargain, a way of getting some of the functions of a high-end CAD program at a much lower price. If you only have occasional need for CAD functions, then DrawTools—at one-ninth the list price of Claris CAD 2.0—really is a bargain. However, if you are doing serious engineering or architectural work, you may find that DrawTools—like many other so-called bargains—is only worth what you paid for it.

DrawTools is a set of three desk accessories—Sizer, Adjacency, and Tools—that you place in the Apple menu with the DrawTools installer.

Sizer

Sizer has the unique distinction of being both the most useful and the hardest to use of the three tools. Select an object and open the Sizer DA. Sizer's dialog box appears on the right side of the screen and reports the width, height, diagonal distance (if appropriate), angle of rotation, and area of the object (see "Down to Sizer"). When Sizer is operating, MacDraw II's tools and functions become inactive, including all the menu items except for File, Edit, and Sizer's own menu item.

Sizer's most useful function is resizing the dimensions of an object with precision. By entering numbers with the keyboard, you can change an object's height, width, and diagonal dimensions absolutely or as a percentage. Changes made with Sizer appear immediately in the MacDraw II file.

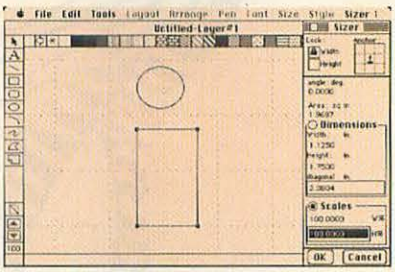
Height or width can be locked so that you can't inadvertently change the dimensions of an object. Sizer also has an anchor, consisting of a square divided into nine smaller squares. Placing a small anchor icon in one of those squares controls which part of an object remains fixed during resizing. For instance, setting the anchor in the center causes an object to grow or shrink from its center when resized.

While Sizer's functions are undeniably useful, its implementation is clumsy. For instance, if you want to resize or get the measurements of a variety of different objects, you have the choice of either opening up Sizer again and again—a process that takes an average of more than two seconds each time on a Mac Plus—or leaving Sizer's rather large dialog box open all the time, which covers a good chunk of a Mac Plus or SE screen.

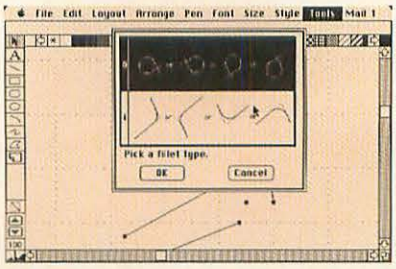
Adjacency

Draw Tools' second DA is Adjacency. Unlike the multifunctional Sizer, Adjacency does just one thing: it shifts one object so that it touches another.

To use it, select two objects and then invoke Adjacency from the Apple menu. Adjacency moves the last-drawn object to a point touching the nearest side of the other selected object. If the two objects are aligned along one axis, Adjacency moves one object in a straight line until it touches the other. If the two objects are not aligned with each other, Adjacency moves one object on two axes so it meets the other selected object at its corner (if it is a rectangle), or at an imaginary center point (if it is an ellipse). Adjacency takes less than a second to work, and it does the job without exiting MacDraw II.



Down to Sizer
Shown here is the Sizer's large dialog box at right. The controls at the top of the box indicate that the rectangle's width is locked, and the anchor point is set at the center square.



Fillet Up
The Fillets dialog box for connecting two lines and an arc, shown here, has a somewhat confusing layout. In fact, there are only two choices: O, which connects the arc on the outer side of the lines' convergence, and I, which joins the arc at the inner side of the intersection.

The only problem is that MacDraw II's Undo command doesn't work with Adjacency. This is not a problem if you only want to move one object to an adjacent position with another; if you don't like the way Adjacency has moved an object, you can simply move it back. However, if you are going through a two- or three-step process to get one object to be adjacent to more than one other object, and for some reason Adjacency moves the object to a position you don't want, the Undo command can't help. The manual recommends saving before using Adjacency so changes can be undone using the Restore command. Because of this, making many objects adjacent can be a slow and tedious process.

Tools

The last and best of the DrawTools is Tools. Once opened, Tools appears on the MacDraw II menu bar and stays there. Tools has four functions: Fillets, Extend or Clip, Start, and Snap End. Fillets moves arcs to a tangent position with other arcs or lines. Fillets is useful for joining together lines or arcs with a curved line (see "Fillet Up"). Extend or Clip lengthens or shortens a selected line so that its end point meets the nearest edge of another selected object. Snap Start and Snap End move a line to another line. Because these tools reside on MacDraw II's menu bar, they are easy to operate. But, as with Adjacency, the Undo command doesn't undo changes made with Tools.

If you already own MacDraw II, and you have occasional uses for the tools DrawTools provides, then DrawTools is a bargain. If you own MacDraw II and are a professional with professional needs, take Claris up on its offer to sell Claris CAD 2.0 to MacDraw II owners for $499—now that's a real bargain.

—Jonathan Cassell

See **Where to Buy** *or circle 753 on reader service card.*

Color Video Digitizer

COMPUTEREYES PROFESSIONAL

Pros: Fast, simple setup; easy to use; produces high-quality 24-bit color (or gray-scale) video stills. **Cons:** Takes up to 30 seconds per shot; Undo command does not work; no image-manipulation commands. **Company:** Digital Vision. **Requires:** Mac II; 2MB RAM for 24-bit color; still video source (such as camcorder, four-head VHS video deck, or still video camera). Hard disk recommended. **List price:** $449.95.

Desktop video is getting exciting. Unfortunately, it's also getting more technical and more expensive. For these reasons, an unassuming, straight-ahead product like ComputerEyes Professional is welcome indeed. This plug-in board for the Macintosh II family has a single modest goal: to capture any incoming color still video image. This it does—easily and inexpensively.

In One End

The ComputerEyes hardware-and-software setup carries you back to the early days of Macintosh computing when there was no reason to consult a manual; it's probably the most self-explanatory system in Multimedialand. Once you slip the ComputerEyes board into a free slot in the Mac, there's virtually nothing else to set up. Nothing gets dragged into the System Folder, nothing requires the Font/DA Mover. A standard RCA jack is provided as a video input; run a cable (provided) to the output of a VCR or camcorder, and you've got an instant 3-D color-digitizing setup.

On launching the ComputerEyes application, you are offered two buttons: Preview and Capture. Click on Preview to open a small window that gets repainted with the incoming video image once every six seconds. This window gives you the opportunity to set up a shot; focus the camera if necessary; and adjust brightness, contrast, hue, and saturation using the on-screen controls (see "Keying Up"). When everything looks good, click the mouse to exit the Preview mode, and then click on the Capture button.

After a moment, the color monitor fills with the captured image. You can perform several adjustments at this point: experiment with various color controls once again, convert the image to gray scale, or crop the image. Finally, save it as a MacPaint or color TIFF file. That, in essence, is all ComputerEyes does. The results are clean, easy to interpret, and—depending on the video source and your monitor—of professional quality.

Out the Other

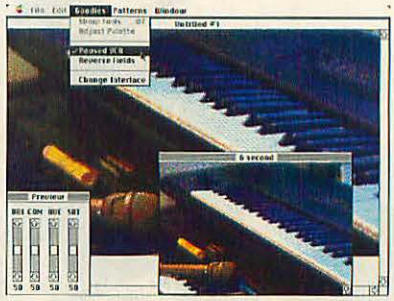
ComputerEyes only requires two other frame-grabbing decisions: slow or fast, and 8-bit or 24-bit color. The Slow/Fast setting refers to the time required to capture an image. The slow setting takes 30 seconds, taking 307,200 one-dot snapshots of the incoming video image—one for every pixel on a standard Apple color monitor. The fast setting only takes 11 seconds, but it records only one-fourth the number of dots of the incoming image, using sophisticated averaging routines to interpolate the colors between samples. The result is quicker capture but somewhat lower image quality.

You set the range of colors that ComputerEyes records by using the 8-bit/24-bit control. Use the 24-bit option for a wider range of colors when you want to print or display a TIFF file. Fortunately, ComputerEyes Professional can record and save a 24-bit color image even if you do not have a 24-bit color monitor. On the screen, you simply see an 8-bit representation of the 24-bit color image.

From the Source

Anything that produces a still video image can be ComputerEyes' eyes. A camcorder on a tripod (or a table) is one of the best sources—provided you're capturing a stationary object. (People are not terrific candidates for this process, unless they are willing to hold absolutely still for 30 seconds.) In other words, the camcorder-and-ComputerEyes combination is something like a very flexible 3-D scanner. You should be aware, however, that a good image requires very strong lighting.

Another possible video source is a VCR. One of the smartest features of



Keying Up

Using the on-screen scroll bars at left, you can adjust the color of the incoming picture and see the effect immediately *in the Preview window* (the small window at lower right). Only when you're happy with the overall effect do you capture the image (background).

Hello, Dali

By deliberately moving the subject of a camcorder shot during the time it takes ComputerEyes to capture the image, you can create some strange, rubbery effects.

ComputerEyes' software is the Paused VCR command. When you select this item, the program does a reasonably good job of creating a coherent image from the typically unstable signal produced by a VCR on Pause. You'll find, however, that only the more expensive four-head home VCRs work well with this feature. (If you've ever seen the wildly distorted, flickering TV display produced by a typical three-head VCR on Pause, you'll understand why.) Of course, higher-end video decks produce proportionally better results; the ComputerEyes board also has a mini-DIN connector jack for use with S-VHS decks.

The third potential video source for ComputerEyes is a still video camera, such as the Canon XapShot. This camera captures still video photos onto a 2½-inch floppy disk and then plays them back for viewing on a TV set. But according to Digital Vision, the XapShot is also a natural for the Computer-

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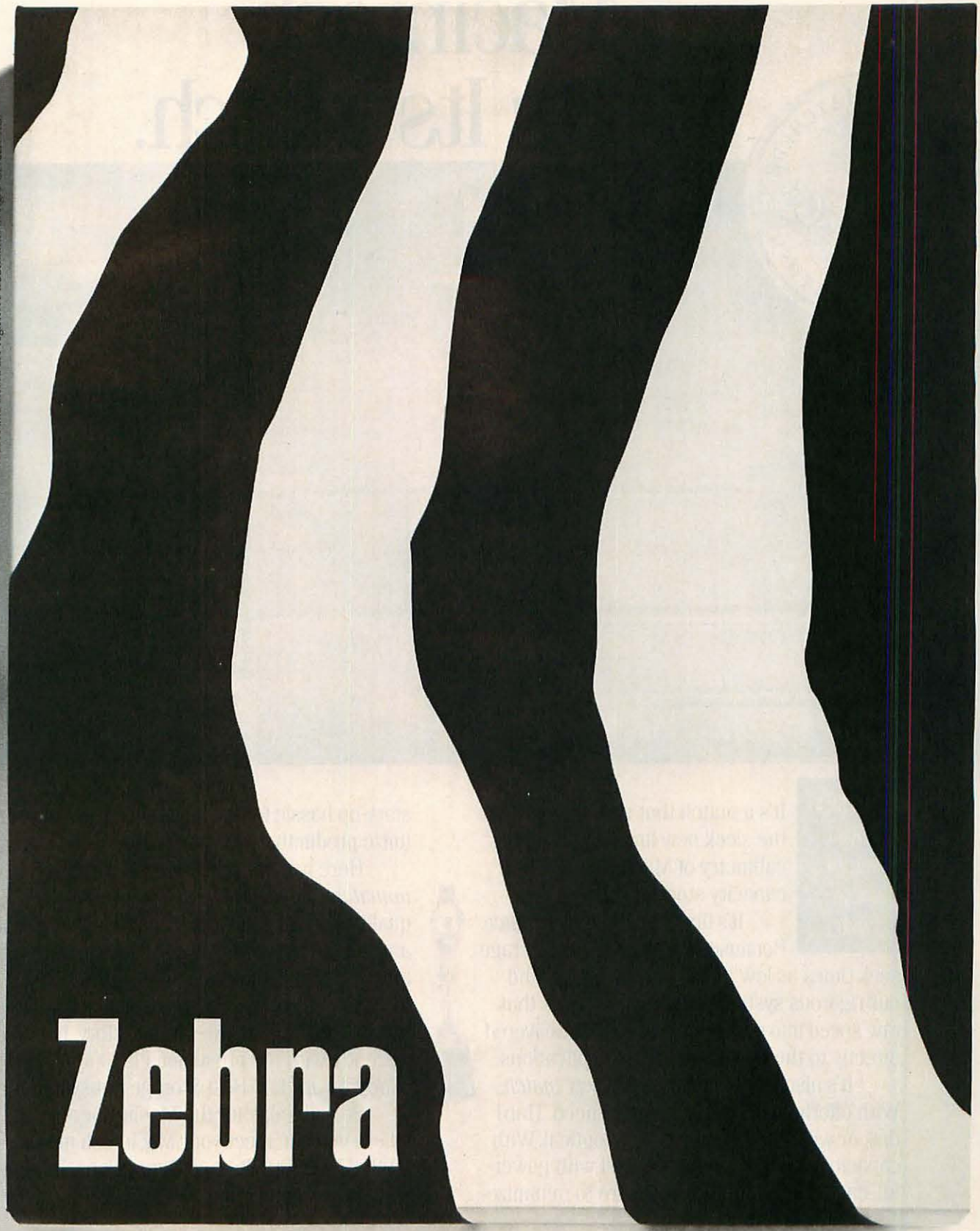

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MWD-MS2

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Eyes system. (Digital Vision sells the XapShot, for around $550.) The high-tech XapShot-and-ComputerEyes combination is ideal for producing databases of digitized photos (for real-estate agency files, online personnel files, and so on).

And finally, here's an off-the-beaten-track application for ComputerEyes you might stumble upon. If you're using a camcorder and your subject *does* move during the capturing process, don't immediately curse and discard the file. Take a look at it first. Sometimes this time-lapse effect produces creepy, melting-witch effects (see "Hello, Dali").

The Eyes Have It

ComputerEyes will inevitably be compared with its archrival, the Koala MacVision. The MacVision is an external box—not a NuBus board—that performs the same video-capturing functions. If you're comparing the two, you should know that the MacVision contains a host of image-manipulation controls (sharpen, blur, rotate, copy, paste); ComputerEyes offers none of these. To edit or enhance the images you capture from ComputerEyes, you have to rely on a graphics program that can read color TIFF files. And while we're discussing negative points, ComputerEyes' Undo command doesn't work, either.

Nevertheless, ComputerEyes is the better value: for $50 less than the gray-scale–only MacVision, you get color. As a matter of fact, ComputerEyes is the least-expensive 24-bit color digitizer on the market. (Note that both products are usually heavily discounted.)

ComputerEyes comes with an unassuming but thoughtfully written manual. At only 44 pages, it manages to be technically complete, free of computerese, yet full of useful suggestions for obtaining the best results. A technician at Digital Vision matched the product's personality profile, too—he was pleasant, unflappable, and happy to explain how the board does its one trick. And in the increasingly expensive, technical world of desktop video, producing a simple, steady, functional product like ComputerEyes is a good trick indeed.—**David Pogue**

See* Where to Buy *or circle 738 on reader service card.

Disk Optimizer Utility

DISKEXPRESS II 2.04

Pros: Seamless background operation; optimization based on hard disk activity. **Cons:** No automatic timing control; certain files not prioritized; serial-registration protection scheme.
Company: AlSoft. **Requires:** Mac Plus; System 6.0; hard disk. **List price:** $89.95.

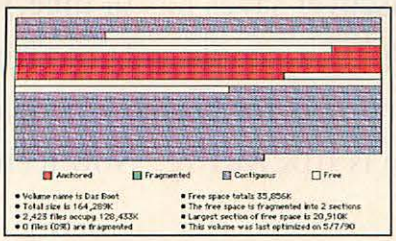
Right out of the box your new hard disk hums, but as you write new files and delete old ones you will notice the hard disk drive has slowed considerably. This is often due to disk fragmentation: the drive writes files into noncontiguous sections because contiguous free space is not available. Putting files together (optimization) and reorganizing your hard disk (prioritization) can be time-consuming.

DiskExpress II is now a combination INIT and cdev: just drag the file into the System Folder and reboot. DiskExpress runs in the background, automatically optimizing mounted volumes. It couldn't be easier.

That New Optimatic Technology

DiskExpress allows you to optimize any hard disk manually, or to set the program to optimize any mounted HFS volume automatically. Volumes mounted on a file server can be optimized, but not volumes across a network. DiskExpress recognizes the number of copies of DiskExpress on a TOPS or AppleShare network and will not load if you exceed your site license.

When installed, the program writes an invisible file called the Disk Express Activity Log in the top folder. Files are classified as anchored (virtual swap files, copy-protected files, and most partitions) or as movable. Movable files are further classified depending on frequency of use and size. DiskExpress arranges files in the following order: volume directory; active files (files that don't change size, such as system files and applications); volatile files (files that change space, such as data files); free space; sporadic files (files used occasionally, but whose size is constant, such as utilities); and dormant files (files not used).



Graphic Display
DiskExpress II provides a graphic display that exhibits all pertinent disk information. Units of 50 blocks are shown with their file type.

I have two large files that DiskExpress couldn't recognize and therefore could not prioritize: a 14MB Virtual swap file for virtual memory and a 30MB SoftPC partition used to emulate an IBM PC hard disk. When I turned off Virtual, the swap file coalesced with my SoftPC file into the center of the free disk space. Unfortunately, the prioritization system, while good, is not perfect.

DiskExpress automatically optimizes a hard disk when the system hour advances. I am not sure you need to optimize a hard disk every day, and I think you should be allowed to set an interval, either in days or in fragmentation percentage. You can turn the program off and on to set the interval manually.

The Hole Story

The first time I ran DiskExpress, it detected a directory error and would not run (AlSoft provides a disk diagnostic called DiskCheck for determining directory errors). I tried various other hard disk utilities; some could detect the error, some could not. SUM II could not detect the error and optimized my hard disk leaving the error intact.

I am particularly careful about adding new INITs to my system, having dieted down from over 40 INITs to 17. I haven't detected any INIT conflicts involving DiskExpress, so my impression is that DiskExpress is a stable, well-engineered product.

DiskExpress II 2.04 is a significant upgrade that will save you considerable time. Although I would prefer somewhat more control over how the program operates, I appreciate its ease of use. I highly recommend DiskExpress.
—Barrie Sosinsky

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Writing unlimited.

The freedom to write and think is for all of us. Now, there is a new word processor that's just right for us, too. It's called MacWrite® II, and it's made by Claris. MacWrite II makes it possible to share your ideas and thoughts with other computers and word processors. You'll be free to open documents from over 50 word processors, on all kinds of computers, with all kinds of speech, and work on them without reformatting.

But there's more you can do. (The feature is called XTND.) You can import graphics, not only from Macs, but many computers, guaranteed. And you can scale and crop them, one and all, in your MacWrite II document. In short, MacWrite II with XTND is a powerful word processor that lets you freely exchange text and graphics. You'll find also that your MacWrite II lets you change fonts, styles, sizes and colors, as well as text with its find/change feature. And you can create custom styles and save them as stationery — with all formats preset. You'll share your reports and letters quickly.

But what good is freedom of expression if you find your editing to be a hassle? That's why the page layout and editing is fully WYSIWYG: the thoughts you see are the thoughts you get. This WYSIWYG feature, by the way, is found only with MacWriteII. It's another way Claris simplifies word processing for you, whether you're 52, 22, or 72.

Called upon daily MacWrite II smooths your writing assignments and other chores. There's MacWrite II spell checking, for example, and foreign dictionary programs that are optional, and a host of other features that come standard. (Like a thesaurus, and a mail merge feature you'll discover saves lots of time.)

What it adds up to, you'll find, is a simple and powerful tool designed for people. All the people. It is for writers, and it is for business people. And it is for those of us in between. The freedom to write is liberating. Now technology is, too.

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Some XTND translators are optional. They are supported within MacWrite II 1.1 when you buy and install MacLinkPlus from Data Viz, Inc.

Circle 388 on reader service card

Forms-Management System

FAST FORMS 2.0

Pros: Easy to learn and use; easy import and export; includes ten templates. **Cons:** Slow; limited Undo feature; manual recalculation only; restricted calculation formula length. **Company:** Power Up Software Corporation. **Requires:** Mac Plus; System 6.0. **List price:** $179.95 (includes a five-user license for Fast Forms Filler).

Forms, forms, forms. No matter how you might hate filling out the blasted things, the fact remains that forms keep business rolling. Forms-management packages that promised us relief from organizational woes have proven to be too expensive or have required too much time to master. Unlike other forms-management applications, Fast Forms 2.0 is in a category all its own. It is a well-designed package that is easy to learn and use and is priced right. Unless you're working on complex forms, you won't miss the features touted by the more expensive packages.

Fast Forms comes with two separate applications: Fast Forms, for creating electronic forms; and Fast Forms Filler, which is limited to filling out forms.

The Fast Forms 2.0 work area is similar in many respects to a draw program, combining a set of drawing and page-layout tools that let you create forms. Once you have created your form, you have a choice of printing the form and filling it out by hand, or filling it out using Fast Forms or Fast Forms Filler. Using Fast Forms to fill out forms has many advantages, including calculated fields and sequential numbering. Fast Forms can also import and export data to and from any application that supports text, including comma-and-tab-delimited text. One option is to use Fast Forms simply as a familiar-looking front end for an application that can otherwise use Fast Forms' form data, such as 4th Dimension.

Getting started is easy. The first step is to design a form using Fast Forms' built-in drawing capabilities. You use its drawing tools—line, rectangle, and oval—to draw nonchanging elements, such as a company logo or rules and borders. You can use any of Fast Forms' drawing aids for grouping, duplicating, and aligning objects, and more. You use the text tool to add titles, field labels, or any text that you want to appear on every form.

Fast Forms has two planes—printing and nonprinting. The advantage is that you can scan a hard-copy form and place it on the nonprinting plane using the Clipboard. You can then manually trace over the copy to design a new form. Having the original form in the background makes it easy to design an electronic form to match the original.

Fast Forms' field tool is unique. There are five types of fields you can place in a form: a text field, which holds standard information; a number field, for numeric information; a calculated field, which calculates numeric information from other fields; a check box; and a counter. Most of these fields can be formatted; for example, the numeric field can show a dollar sign or commas. You can also establish a range for a field to prevent user error.

Once you've designed the form you're ready to enter information. You can enter information using Fast Forms; or if you do not want changes to be made to the form, you can use Fast Forms Filler. As you enter information, it's kept in a separate file that you can search using the Find command. Unfortunately, the Find command won't accept wild cards or algebraic operators as search parameters.

Fast Forms is easy to learn. Once you've worked through the tutorial, you will have no problem using the basic drawing tools and commands to design a form. To make things easier, Fast Forms includes ten templates for commonly used forms like invoices, phone messages, fax cover sheets, and purchase orders.

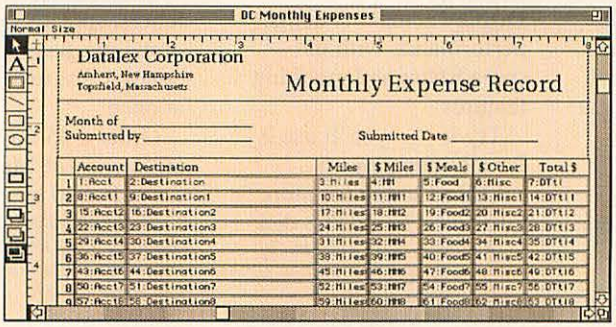
There are, however, some caveats. I created a monthly expense-reimbursement form that contains over 200 fields. Fast Forms takes a long time to scroll from the top to the bottom of the form (even though I was using a Macintosh IIcx) because it redraws fields before it enters the information. I had a similar problem with the calculation fields. When you use the Manual Calculation command (unfortunately, there is no automatic calculation command) the program takes several seconds to complete a calculation. If you need to recalculate a form, you might find yourself tapping your fingers.

I also encountered a few minor quirks in the creation stage. First, the Undo command isn't always functional. This was particularly noticeable when using the Duplicate command to duplicate objects (including fields) a specific number of times across and/or down a page. For example, if you duplicate a field and the number you specified won't fit on the page, you have to erase the duplicated objects manually instead of being able to rely on Undo. And I accidentally discovered that a field's calculation formula can't exceed 256 characters. So if you use long field names and create a formula using many fields, Fast Forms might not accept the formula because you have exceeded the 256-character limit. You have to go back and rename the fields with shorter names.

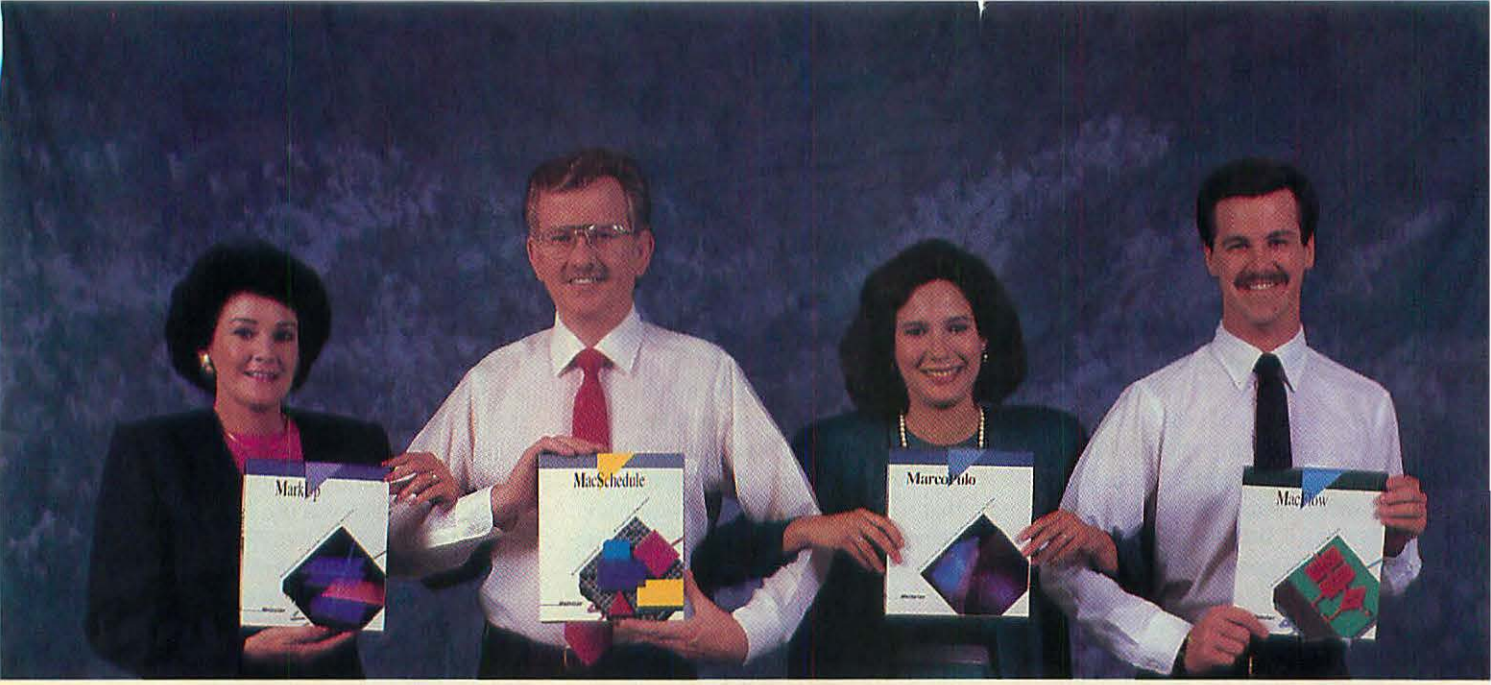
Fast Forms includes a well-written manual together with context-sensitive help. And it's a good value, especially considering that the purchase price also includes a five-user license for Fast Forms Filler. If you need to produce forms quickly and efficiently, take a close look at Fast Forms.

—Keith J. Thompson

See **Where to Buy** *or circle 761 on reader service card.*



Fast Forms
The Form window includes design tools and palette controls along the left-hand side of the screen.



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Computer-Aided Design and Drafting

MACBRAVO 2.0

Pros: Includes a complex surface tool; can link details to a model. **Cons:** Nonstandard Mac interface; long learning curve. **Company:** Schlumberger, CAD/CAM Division. **Requires:** Mac II; 5MB RAM; System 6.0.2. **List price:** Version 2.1 MacBravo Modeler $1495, MacBravo Detailer $1995, IGES Translator $495.

Over the past few years, the major stumbling block in the Mac CAD arena has been the slowness of the Mac and the lack of Mac CAD software powerful enough to entice mainframe users. Schlumberger has now bridged the gap between limited 2-D and 3-D CAD packages with MacBravo 2.0.

Intricate Design

MacBravo 2.0 comes in three separate modules. Two, MacBravo Modeler and MacBravo Detailer, are specifically used in design and drafting; the third module, IGES Translator, allows you to transfer drawings, though with limited success due to the weak IGES standard for handling surfaces and splines from other platforms.

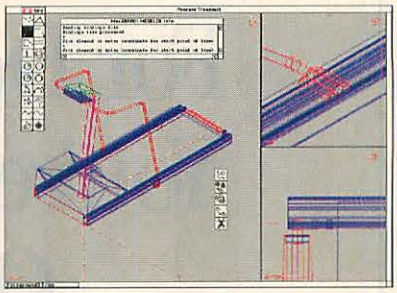
Usually you begin a design using the Modeler module to create a three-dimensional representation or a wire-frame model using lines, arcs, circles, and splines. Like most 3-D CAD packages, MacBravo uses a concept known as workplanes, a 2-D plane, to create wire-frame models.

The Modeler interface consists of three major windows. You create drawings in the Model window. The Info window, directly below the Model window, prompts you after you select a command. For example, if you type copy in the Info window, Modeler asks you to define the area or object to be copied. The Tool window is essentially a tool palette with five icons. Selecting the geometry icon, the first icon in the Tool window, displays a large floating palette with line, arc, circle, spline, and filleting tools. You can get a dialog box for setting parameters such as circle diameter, fillet radius, and so forth, for each geometry tool by double-clicking on the tool. The second icon, the primitive-surfaces icon, allows you to create cones, cylinders, and spheres. The third icon, the complex-surfaces tool, lets you create surfaces using any two curves or splines. The last two icons on the tool palette—move and copy, and time and extend—are included in all CAD packages.

With the inclusion of the complex-surfaces tool, MacBravo now surpasses all CAD packages available on the Mac in functionality. As of this writing, MacBravo is the only 3-D package that allows complex-surface–intersection calculations. AutoCAD Release 10 can do some complex surfaces, but the similarity ends there. Imagine that you want to drill a hole in a cylinder perpendicular to the cylinder's axis of symmetry. Or, to take it a step further, you want to countersink a hole. The diameter of the hole is determined by how deep you drill the hole. To further complicate the geometry of the hole, there are two different diameters since the hole is oval shaped. The best way to determine the exact shape of the hole is to create two surfaces, one cylindrical and one conical. Modeler can then calculate the intersection of the two surfaces and define them with a spline. This ability to calculate surface intersections makes MacBravo 2.0 the most complete and sophisticated package available on the Mac to date.

Don't Sweat the Details

Now that you've completed a model, your next major task is to add dimensions and notes to it so you can machine the part or build the building. MacBravo Detailer allows you to link details to a completed model. MicroStation Mac from Intergraph is the only other 3-D CAD package for the Mac that offers this exceptional feature. The 3-D mode tool on the tool palette links a detailer file to the model. This tool also lets you rotate a 3-D model before linking it to the Detailer file and lets you create multiple views of a single model. To begin detailing a 3-D model, you open MacBravo Detailer and link a 3-D model to a new Detailer file. Detailer includes options for linking to Bravo3, Schlumberger's mainframe CAD package which runs on DEC VAX systems. Through an Ethernet network, you can link a Detailer file to an existing model created and stored on a VAX.



Modeler Treadmill
As models become more complex, multiple views are important in helping you create a model as quickly as possible. A 19-inch monitor also becomes an indispensible tool. (The background has been changed for clarity.)

With your views of a model in the Detailer file, you can begin the arduous task of assigning dimensions and notes. Detailer includes the capability to do geometric dimensioning and tolerancing per ANSI Y14.5M. Other features such as hatching, hidden-line removal, and general line and arc creation can be used in the same way as in the Modeler module. The Detailer interface, with the exception of the tool palette, is exactly the same as in MacBravo Modeler.

High Performance

MacBravo has a programming language known as the Flexible Interface Tool (FIT). Like AutoCAD 10's AutoLISP, FIT allows you to program any feature or tool not already included in MacBravo. For example, you can program repetitive commands for MacBravo tools. You can even rearrange the tool palette and menu commands using FIT.

So what kind of system do you need to run this CAD package? Although MacBravo runs on a Mac II or SE/30, you really need a Mac IIfx with at least 8MB of memory. And I recommend even more memory once System 7.0 is introduced. You definitely need more than 8MB as drawings get more and more complex. I also recommend a 19-inch monitor and a fast hard disk drive. I used MacBravo on a Macintosh IIx with 8MB of RAM, a 19-inch and 13-inch monitor and an 80MB hard disk. I would definitely consider getting a larger hard disk because the Modeler and Detailer modules require a total of 9MB.

(continues)

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Drawing the Line

MacBravo does it all, no ifs, ands or buts. Even though I couldn't find any major feature lacking in the program, you can use FIT to program any missing tool or feature. My only real complaint is the unusual interface. MacBravo 2.0 is a giant improvement over version 1.0, but the interface still needs to be improved. MacBravo 2.0 is geared toward mechanical engineers, architects, or anyone who needs to produce accurate 3-D drawings. I strongly recommend attending Schlumberger's training course in Ann Arbor, Michigan, after you purchase MacBravo, because the interface does not strictly adhere to the Mac standard and the program takes many weeks if not months to master on your own. MacBravo is a great program if you are migrating from a large CAD workstation platform to the Mac, and should not be overlooked when deciding on a top-of-the-line 3-D personal computer CAD package.—**Victor Elgohary**

See **Where to Buy** *or circle 813 on reader service card.*

Diagram-Creation Tool

TOPDOWN 2.0

Pros: Many predefined symbols; links diagrams vertically or horizontally; imports graphics from other programs; provides error checking. **Cons:** Addendum to manual for version 2.0 features is confusing. **Company:** Kaetron Software Corporation. **Requires:** Mac Plus. Hard disk recommended. **List price:** $345.

With TopDown you can prepare flow charts, structure charts, system diagrams, data flow diagrams, organizational charts, training guides, business-plan documentation, or any other type of documentation that needs to link objects or graphics together on a page to show some special relationship between them. Using TopDown, it is easy to quickly create professional-looking flow charts that clearly show every aspect of a complex process.

Many of the program's drawing tools look familiar, such as the text, line, box, oval, and cylinder tools. Others are unique to TopDown, like the tool for making connecting lines. It automatically creates an arrow that points to the second object selected.

Very Symbolic

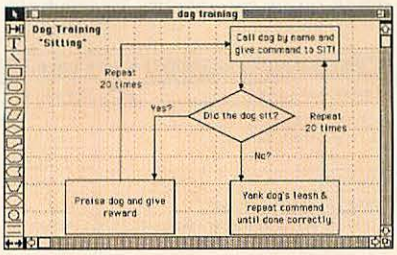
In TopDown different symbols (shapes) represent different tasks in the process you are trying to define. In a flow chart, for example, rectangles might represent decision steps and diamonds might represent decisions. In all, you can use up to 96 types of symbol, and 48 of them you can create yourself using a bitmap pad that is 32 bits by 32 bits.

You place symbols on the page in the order that you want the respective tasks to be performed. As you place each symbol on the page, the program automatically numbers it so that you can keep track of each step. You also can associate text, such as a description of the task, with each symbol. Text appears in the center of the symbol, but if the text is too long, anything that doesn't fit within the symbol does not appear. You can enter or edit the text in a symbol at any time.

Charge It

Suppose you want to depict how a store clerk processes a credit card purchase. Some steps involving verification (checking account and price information) could be represented by clear rectangles; decision steps (deciding if the customer has enough credit to make the purchase) could be represented by diamonds; and physical steps (putting the merchant's copy in the register) could be represented by filled rectangles. You would then connect the symbols with lines and arrows to show how one task follows another.

If one task is particularly complex, you can create another, *lower level,* drawing that describes the task and link that drawing to the symbol in the *parent* drawing. In the above example, you might have a second drawing that shows a credit card charge slip that has all the appropriate blanks labeled with a description of the proper data.



Dog Training

This flow chart covers the steps required to teach a (cooperative) dog to sit. The rectangular steps represent actions on the part of the owner; the diamond-shaped step represents a decision step.

TopDown's ability to link drawings in this manner allows you to display things at a high level, and then describe individual tasks or symbols in more detail by linking their symbols to other drawings. TopDown also lets you associate information with any symbol by creating a note card for it. You can include as much text as you need to annotate the task, but unfortunately you can't include graphics. The text from these note cards can be printed separately or exported as a text file. You can also export drawings as PICT files.

Keeping Track of the Process

TopDown provides a few good tools for tracking and proofing these complex documents. Show Hierarchy opens a window listing all the drawings in a document in outline format; linked drawings are indented under the drawings they are associated with. From this window you can quickly select and open any drawing in the document.

TopDown has three types of reports. The first is an outline format that lists every symbol by number, the name of the drawing that the symbol appears in, and the text that is associated with the symbol. The Cross Reference report shows each symbol, with each symbol that is attached to it, in the order you have set up; this makes it easy to verify that you have properly ordered the tasks that describe your process. The Errors report lists symbols that have unmatched arrows, for example, one arrow pointing in, but no arrow pointing out.

TopDown's manual is complete, and there is online help with the program. The manual's one difficulty is that it covers the version 2.0 features in an addendum. You must look for help in two different parts of the manual, using two different indexes.

If you're the type of person who likes to see how things work by drawing them on paper, or who must do that to explain a procedure to someone else, TopDown is the right tool for you.—**Brooks Hunt**

See **Where to Buy** *or circle 888 on reader service card.*

Relational Database

CAT III 1.0

Pros: Fast; built-in file-sharing facility; improved word processor; forms generator has calculation feature. **Cons:** Submenus can be inconvenient; quirky user interface; weak documentation.
Company: Chang Labs. **Requires:** Mac Plus; hard disk; System 6.0.2. **List price:** $495.

A few years ago CAT 1.0 promised to organize your appointment books—along with the myriad little stick-on notes, pink telephone slips, and various other small scraps of paper that you have lying around. The program was hard to use and had difficulty producing the hard copy reports that I needed. CAT has matured into CAT III, and the program now does a better job of accomplishing its original mission.

As a relational-database tool, CAT not only replaces my scraps of paper, it organizes my contact information into views that let me see who I need to call and when, who I sent follow-up letters to last month, or what I have scheduled for next week. The beauty of the system is that you can view client information in any number of ways—by client, by time, or by activity.

Little Black Book

To get started, you enter basic information about clients onto a CAT Name Card; this procedure is much improved over the confusing double-entry system used in earlier versions. The left side of the Name Card holds basic company data, and the right side contains information about individual contacts at the company. You can have any number of contacts and you can code each contact with user-defined keywords such as Active Customers or Suppliers for quick retrieval.

Once you enter the client information, the next step is to define activities—such things as incoming and outgoing telephone calls, letters, and meetings. CAT keeps track of the client, the time, and the activity for you.

A major change in CAT III is its improved word processing and forms processing modules. CAT III offers a basic set of word processing tools, including commands for font handling, alignment, finding and changing, and a glossary menu for frequently used phrases. The word processor is similar in functionality to MacWrite. You can output not only form letters using the CAT III word processor, but labels (both ImageWriter and LaserWriter) and envelopes too. The forms processor has a set of basic drawing tools for incorporating graphics into forms and reports. For example, you can design an invoice with your corporate logo at the top. The forms processor also includes a calculation command for filling out an invoice or purchase order.

One of CAT's most outstanding new features is its built-in ability to integrate client-record updates into a master file. For example, salespeople can easily update the original CAT data file with new information when they return from a sales trip, thus keeping the central file up-to-date.

Teaching an Old Cat New Tricks

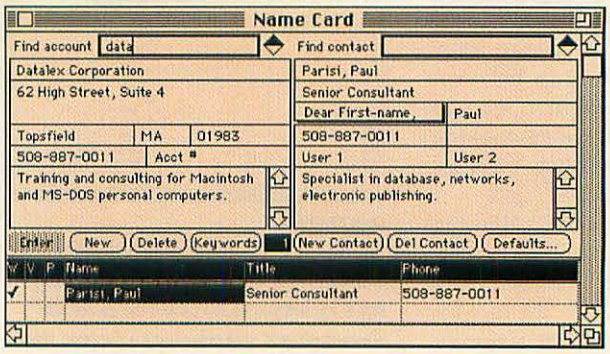
Despite all the progress, there is room for improvement. CAT still does not follow the Mac user interface as faithfully as it could. For example, when editing an account or contact record, you can use the Return key to move from field to field, but you need to use the Tab key to move from the address or notes fields—if you accidentally use the Return key any information in those fields is deleted. CAT uses some uniquely designed buttons to invoke commands. For example, to move from one record to another you click on a small diamond-shaped button—click on the top to move backward, the bottom to move forward. Unfortunately, the diamond is too small to access quickly. Another minor inconvenience is CAT's use of submenus for commonly used commands; for example, you must use a submenu and not a keyboard command to access a Name Card. Some submenu items do have a keyboard equivalent; even so, the menu structure should be improved.

Another problem: you can select records for export to other CAT applications, but you cannot export a CAT dababase as a simple text file (the Export Text command in the File menu is not functional). This presents a problem if you want to extract data from your CAT database for further analysis in Microsoft Excel, or use a select list of names in a Microsoft Word merge letter. Change Labs promises to activate this command in a future version of CAT. The only procedure for exporting text is to buy Solutions' SuperGlue, which lets you export text to any application that accepts text files.

What is most bothersome about CAT III, especially during the learning process, is its documentation. Often its terminology and explanations are not clear. The manual is laced with typos (some of which are documented in a separate errata sheet) and is inconsistent in presenting the program. For example, the manual spends several pages explaining very basic Macintosh conventions like using the mouse but doesn't devote much space to practical examples of how you could use CAT in typical office scenarios.

So what's the verdict on CAT III? CAT will help reduce the clutter on your desk, but you will have to accept CAT's occasionally quirky interface and spend some time deciphering parts of the manual. Once you learn the program, however, you will be able to crank out sales and marketing information and manage your time better. I've come to the conclusion that this is one CAT with several lives.—**Keith J. Thompson**

See **Where to Buy** *or circle 732 on reader service card.*



The Name Card Window
You can locate a record by typing in one of the text boxes at the top of the Name Card window. CAT starts to locate records as you enter the company or client name.

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Color Painting and Retouching Software

VIDEOPAINT 1.0

Pros: Great 3-D and special effects. **Cons:** Documentation does not cover all points and in some cases gives the wrong information. **Company:** Olduvai Corporation. **Requires:** Mac II; 2MB RAM; 5MB RAM if using MultiFinder; hard disk with 2MB free space; System 6.0.2. **List price:** $495.

VP

With the numerous paint packages currently available for the Mac, a new product needs to offer features that make it stand out. VideoPaint from Olduvai (formerly GraphistPaint from Aba Software) has a few neat new tricks and some good reworkings of some old tricks, but it also has a few downfalls.

Tool Palette

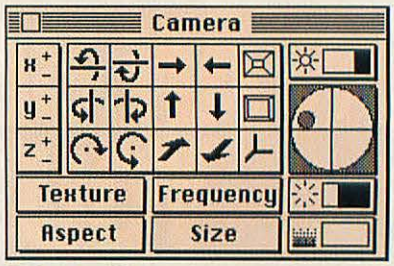
VideoPaint's tools offer some nice techniques. The Waterdrop tool has two modes, True Colors and False Colors. True Colors works as a smoothing tool that softens colors and edges. VideoPaint accomplishes this by introducing intermediate colors between the colors being smoothed. Blending unrelated, or False, colors (a capability not original to VideoPaint) gives rise to some very unusual effects.

The Airbrush tool has three different shapes—dots, lines, and circles—but no large sizes. The line tool has the usual features, but one big drawback is that even in the one-pixel size, it produces a four-pixel-weight line.

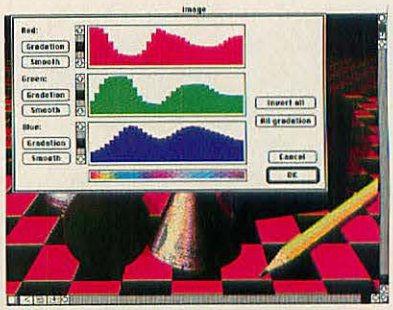
VideoPaint has multiple paintbrush tools, including the standard brush with its modifiable shapes and sizes. The anti-Alias brush minimizes the effect of the jaggies in a curve by adding color pixels between the chosen color and the background colors. The PolyBrush produces strokes using a variety of polygons. These shapes are created in the Edit PolyBrush dialog box. The PolyBrush also has various modes and sizes that make some special effects possible. The Round Paintbrush and Square Paintbrush work with all the patterns, graphic modes, and effects available. All the traditional paint tools work in the usual manner.

The 3D tool, also on the tool palette, really makes VideoPaint stand out. It is very easy to master and works in a way that other 3-D programs should adopt. Clicking on the 3D tool displays a subpalette with seven shapes including Cube, 3D Circle, 3D Rectangle, Sphere, Cone, Cylinder, and Perspective plane. After you select a shape it appears in the window; when you click anywhere in the window the Camera window appears that contains all the 3-D controls. You can move, rotate, and distort shapes.

You can also focus a single light source as well as control its intensity. A scanned texture, photo, or painted image can be mapped onto any of the 3-D shapes. The Aspect option defines the appearance of the mapped image. Aspect choices include Standard, a matte or dull finish; Metal, which is light reflective; Plastic, which reflects the light softly; and Special, a bright reflection of light. The light is reflected as a hot spot, VideoPaint's 3D tool offers no ray tracing.



3D Camera Window
Objects created with the 3D tool are manipulated in the Camera window. You can place objects and choose a viewing angle within the three-dimensional space with the buttons.

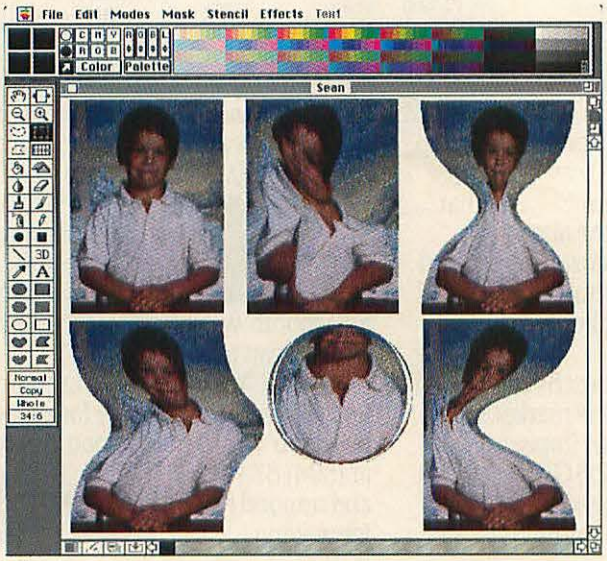


The RGB Window
You can manipulate colors by dragging either the cursor in the graph windows or the scroll bars to the left. Selecting the Gradation button sets the range in a straight ramp. Smooth lessens the difference between colors.

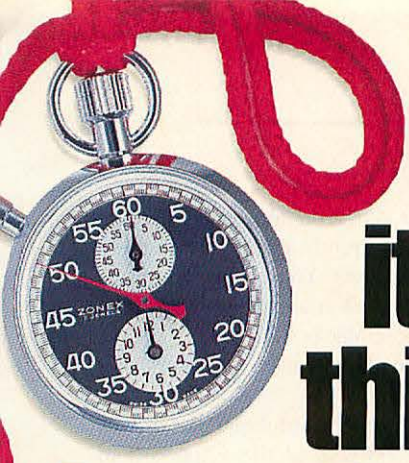
Dynamic Effects

The Dynamic Effects submenu contains some effects that are quite useful, especially in the creation of certain types of animation. Distortion 2, for example, splits a selected area into a user-specified number of squares. You can move any of the points of the squares to get a distort effect. Every square is changeable, making for some bizarre image distortions. There is also a series of bezier-based distortions. You can manipulate the handles on the side of a selection to bend and reshape images. Spherization, another distortion option, takes a selection and maps it to a ball shape. This differs from the 3-D sphere-image mapping because there is no light source.

(continues)



Effects
A number of special effects can be achieved by using the Dynamic Effects feature, which enables you to create an elaborate set of distortions.



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In addition to the variety of dynamic effects, all the effects found in traditional photo-retouching programs are also available, including Blur, Smooth, Sharpen, Diffuse, and Flips.

Olduvai calls VideoPaint a program for professional color painting and retouching, but compared to the sophisticated 24-bit color-retouching programs currently on the market, it falls short. It can compete with black-and-white retouching programs, and in fact surpasses a few, in that it can handle 256 gray levels and has many more special effects.

The Good and the Bad

As a color painting tool, VideoPaint has good and bad points. The color palette is visible at the top of the screen, along with modification tools. There is a series of buttons in the color-palette window that can be used to change colors. Unfortunately the swatches representing the colors are so small they are virtually useless.

Two pop-up menus, Color and Palette, are available within the color palette. The Color submenu commands include Undo; Copy and Paste, which apply to palette manipulations; and access to the HSL- and RGB-table windows. In these windows you can modify colors and ranges of colors, using a graphing system to view the alterations.

The pop-up Palette menu allows you to access 14 predefined palettes in addition to the Standard palette. Additional palettes can be loaded using the Load Palette in the File menu.

The manual, although easy to follow, fails to mention some features and misinforms about others. When I selected the WipeAnimate command, for example, a continuous screen wipe from the main window to the Stencil window began that I was unable to stop. I had to call Olduvai for the solution. (Hold down the mouse button until a full cycle is complete, and when the watch appears, click the mouse.)

If you need 3-D or other special-effects features, then VideoPaint is a good buy, provided you already own another paint program. VideoPaint certainly is a vast improvement over its GraphistPaint incarnation, but if you need access to professional tools, this is not the way to go.—**Burt Munroy**

See **Where to Buy** *or circle 897 on reader service card.*

Network File-Transfer Program

SEND EXPRESS 1.0

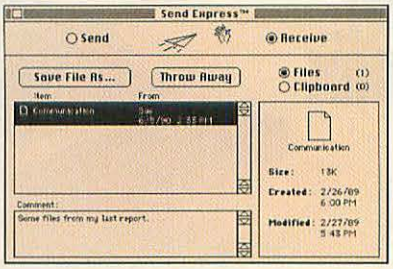
Pros: Can send a group of files at same time; can send files to more than one person at a time; can include a comment for recipient along with file or Clipboard contents; runs in the background.
Cons: Minimal security; no store-and-forward mechanism for inactive users; doesn't support IBM PCs or compatibles.
Company: Gizmo Technologies.
Requires: Mac Plus; AppleTalk-compatible network. **List price:** Five-user pack $179.

Macintosh users can now exchange files on a network even if they don't have AppleShare or TOPS, thanks to file-transfer utilities like Claris's Public Folder, Beagle Bros' Flash, and Traveling Software's LapLink Mac III, which are available for AppleTalk networks. The latest entrant in this market is Send Express.

Sending Files

Send Express is a combination INIT and DA, so installation is straightforward. The INIT is responsible for sending and receiving files in the background; the DA lets you control file transfers—for example, deciding which files to transfer and to whom they should go.

Send Express lets you send one or more files to anyone who is also using Send Express on the network. You simply select the files from the SFGetFile window in the Send Express DA and add them to your list. Then you select one or more recipients from the list of Send Express users.



Saving Files
When you receive a file, you see some of its Finder-related information as well as any comment that's been sent with it. You have the option of renaming or deleting any file that you receive.

You can send files only to users who are currently attached to the network, however. You cannot address a file to be sent at a later time to someone whose Mac is shut down. This is a common disadvantage of file-transfer programs.

You can send multiple files as well as the contents of the Clipboard to another Send Express user. Express has a Clipboard preview window for both the sender and the recipient. And you can add a comment to the group of files (or to the Clipboard).

You can access Send Express's DA in either the send or receive mode. Clicking on the Receive button brings up a list of the files that have been sent to you. Send Express lists the sender, file size, date of creation, and date of modification for each file you receive. You can then choose either to throw a file away or to save it. If you save the file, you can either use the file's original name or save it with a new name (see "Saving Files").

Send Express has no security options. As long as Send Express is active on your Mac, any other Send Express user can send you a file. While this promotes a free exchange of information on the network, if you're looking for some type of security, I suggest you use a program like LapLink Mac III.

Express It

Send Express supports multiple files and multiple addresses, and it runs in the background. It also works across network zones (LapLink Mac III does not), which makes it useful for large networks as well as small ones. Send Express even monitors your Mac usage, slowing down file transfers while you're working with another application, to intrude less on your work. But I would like to have some store-and-forward capability so that files could be addressed to inactive users and sent at a later time. If you intend to transfer files to users not currently active on the network, I suggest using either Flash or an E-mail program. And if you're a stickler for security, then I suggest using LapLink Mac III because of its three levels of password protection and its ability to retrieve files from other Macs, in the background, without user intervention.—**Dave Kosiur**

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Outlining and Diagramming Software

INSPIRATION 2.0.4

Pros: Easy to use; switches back and forth between outline and diagram formats; Focus In feature creates diagram within a diagram. **Cons:** Diagrammer is of limited use on small-screen Macs; over-documented. **Company:** Ceres Software. **Requires:** Mac Plus, second disk drive. **List price:** $199.

Inspiration is a sometimes clever, sometimes mundane tool that Ceres Software calls a "thought processor." On one hand, it is an outliner that does what you expect outliners to do: it lets you subordinate ideas by indenting them, and move topics around with their subordinates attached. What distinguishes Inspiration from other outliners is its diagram mode, which lets you plot your ideas graphically. The diagram mode enables you to visualize connections and hierarchies and makes it easy to brainstorm. You can jot ideas down in no particular order and move them around and establish links later. You toggle between the outline and diagram modes by clicking on a menu option.

Ideas as Words

When you launch Inspiration, it opens in diagram mode, but you can change the default setting so that a new document begins as an outline. Whichever mode you start in, the program prompts you to type in a Main Idea, the central theme or title of your document. Inspiration's outliner distinguishes between headings (topics and subtopics) and notes (the meatier text you use to expand on your ideas). Notes, like subtopics, can be hidden from view.

If you want to print your document in its outline configuration, Inspiration provides a wide range of formatting options. It lets you choose different methods of labeling each topic, such as the classic schoolroom Roman numerals (I, A, 1, a) or the legal system (1, 1.1, 1.2.1). You can insert headers and footers, choose various spacing and indenting options, and ask for page breaks at specified levels of your outline. You can also save a document as a More file or as plain text so you can export it to another application.

Ideas as Symbols

In diagram mode, you can work with or without a grid. The adjustable grid automatically positions the shapes, called symbols, that hold each heading. Inspiration provides a variety of ways for you to start putting ideas down. You can click on an icon to indicate in which direction from the active symbol you want a new symbol to appear (see "Diagram View"). This will automatically link the new topic to the previous topic. You can create an unlinked topic by clicking in a grid square and starting to type, then draw links later by dragging the cursor from one symbol to another. A technique called Rapid Fire lets you enter a series of ideas, each with its own symbol, using only the keyboard.

Inspiration offers a library of symbols to highlight ideas or set them apart. There are basic rectangles and ovals, flowchart symbols, and graphic symbols with icons and numbers.

In outline mode, each topic is preceded by a plus or minus sign, indicating whether or not it has a subtopic. If the plus or minus is outlined—that is, hollow—you know that there is a hidden note. In diagram mode, however, you can tell that a symbol has a note attached only when the symbol is selected. A gray handle in the upper-left corner of an active symbol signals the presence of a note and provides access to it through a pop-up window. The manual suggests doing a Select All to see which symbols have notes, but it would be better if the note indicator stayed visible even when the symbol is inactive.

Tight Squeeze

To start writing this review I jotted down ideas in Inspiration's diagram mode, but I found it easier to arrange my thoughts in outline mode. On my Mac Plus there is not enough screen space to view and manipulate many ideas. If a chart or diagram is at all extensive, you can't get an overview. You can cram a little more onto the screen by reducing the diagram to 75 percent of its normal size and using a larger font so you can still read your headings. Of course, then you have to make your headings extremely succinct so the symbols don't grow and eat up the extra space.

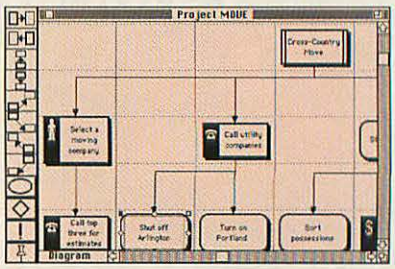

Diagram View

Icons in the top half of Inspiration's tool palette prompt you to position a new symbol in relation to the active symbol. Icons in the bottom half of the palette and in the Symbol menu in the menu bar let you select different shapes and graphics for symbols. Links can be drawn at right angles, as shown, or diagonally.

Inspiration has a useful feature called Focus In that lets you concentrate your attention on one part of a complex diagram or outline. Focus In treats a selected symbol or topic as the Main Idea of a new diagram or outline and hides anything that is not subordinate to it. The links remain, however, and when you are finished developing that component of your document, you can Focus Out.

Easier Than It Looks

Inspiration is easy to use despite a thick and wordy manual that makes the program seem more complicated than it is. The single program disk contains sample diagrams and outlines that demonstrate some ways Inspiration can be used. These include flowcharts, meeting agendas, and business plans. The program could make it easy to create and maintain a company organizational chart. For a large company, for example, you could use the Focus In feature to move from an executive level chart all the way down to individual department structures.

If all you need is an outliner, there are plenty of them built in to word processors and available as add-ons. The word processor MindWrite, for example, includes a really dandy outliner. If you like working visually, however, Inspiration may just be the program you have been looking for.

—Gerry Lukos

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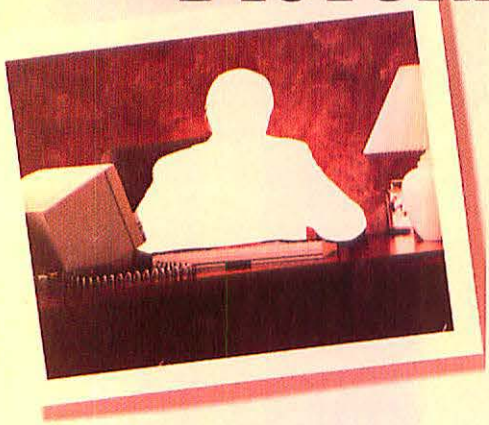

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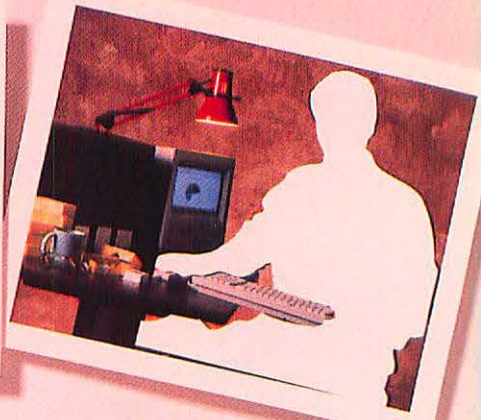

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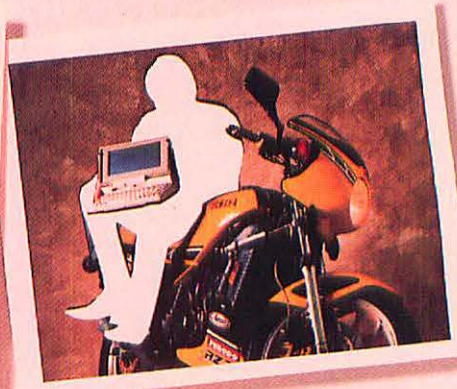

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Jazz Improvisation Software

MIBAC 1.2.1

Pros: Quick lead sheet entry of music with commonly accepted chord notations; plays authentic-sounding jazz arrangements automatically; exports standard MIDI files; effective MIDI implementation. **Cons:** Offers only two meters total, with only one per song; allows no more than two chords per measure. **Company:** MiBAC Music Software. **Requires:** Mac Plus; MIDI interface; Synthesizers that can play piano, bass, and drum sounds. **List price:** $125.

Anyone learning to play jazz faces a dilemma: the best way to learn is by playing with other musicians, but no group will let you sit in for long until you can play. You can now break that double bind with MiBAC, a Mac, and some relatively inexpensive MIDI gear.

Sequencer Built for Two

Although MiBAC is essentially a sequencer, it is specifically designed to produce jazz arrangements that you can practice along with. It is similar to, but more flexible than, those play-along recordings that used to be popular.

Using ordinary MIDI sequencer software, you could do the same thing, but you'd have to specify every note, one by one; in MiBAC, you simply select the chord you want to hear for each two-beat nugget of the tune. Based on that chord progression, MiBAC fills in the details, automatically generating authentic jazz piano voicings, bass lines, and drum patterns (of course, you need MIDI equipment that can deliver reasonably accurate piano, bass, and drum sounds).

Solo to Your Heart's Content

Select a key and time signature, lay out your lead sheet, and a few seconds later you're cooking with a competent rhythm section. Your accompanists may not play with artistic fire, but they always show up for rehearsal, and they let you solo to your heart's content. You can practice scales against the changes, repeat stock riffs till you have them memorized, and blow solos as "out" as you can make them, and no one will mind. You can change the key, tempo, and rhythmic feel whenever you please, with no complaints from the piano player when you say, "Let's do it double time in F-sharp."

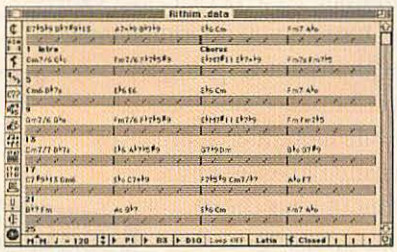
Like the Real Thing

What's great about MiBAC's rhythm section is how much it sounds like the real thing. Created by jazz musicians, MiBAC knows 28 commonly used major, minor, and dominant chord qualities, and it plays them on a MIDI piano in genuine jazz voicings and comping patterns (the rhythmic pattern the jazz pianist uses when backing up a soloist).

Likewise, the bass lines and drum patterns are drawn from the playing of real bassists and drummers, and they swing, if a bit mechanically.

MiBAC's design lets you go straight from the chord progression in your head to a finished song with very little effort. Fortunately, the program uses standard jazz lingo for all the complex chord qualities; *C7+#9* means C dominant 7 sharp 5 sharp 9, as it should. Yet MiBAC also lets you change these default names if you prefer others. On the screen, the tune appears in fairly standard lead sheet format, with chord names at the top of measures, and beats represented by backslashes.

You can type in chord names measure-by-measure as you'd write them on paper; you can select chords from a menu, listening to them before you enter them in your song if you wish. Of course, you can cut, copy, and paste chords for quick modifications and repetitions, and there's an Undo command. And MiBAC's complete MIDI implementation makes it easy to set up the program so that it works properly with any drum machine, synthesizer, and MIDI system. The program works with Apple's MIDI Manager if you have it but functions fine with an unassisted MIDI interface as well.



Lead Sheet

This lead sheet illustrates a minor quibble: when you place two chords in a measure, MiBAC places their names too close together, so that they almost touch.

See It in Print

Once you create a song, MiBAC can print out the progression for your music stand in the same format you see on the screen, even adorning it with a title, tempo notation, measure numbers, and so on. If you want a copy of the actual notes instead, you can export any or all the parts to a standard MIDI file, and then use a notation program such as Deluxe Music Construction Set to print out the sheet music. Sadly, the one thing you can't print is a lead sheet with a melody line.

Aside from producing practice tracks quickly, MiBAC actually has a few features intended for arranging or composing as well. It gives you the option of measure-by-measure and chorus-by-chorus control over the volume of backup instruments, the particular drum and synthesizer sounds you hear, and the chord progression itself. Fiddling with these options doesn't make sense, though, if you're just trying to set up a practice track. On the other hand, because MiBAC exports MIDI files, it works well for blocking out arrangements that you then flesh out in a conventional sequencer.

Still Needs Practice

Although even advanced jazz musicians should find the current version of MiBAC a valuable practice tool, the program badly needs a couple of improvements before it's really complete. MiBAC's most serious limitation is that it only knows two meters, 4/4 and 3/4. You'll have to wait till an update comes out to practice your five-against-four rhythms. What's more, you can't change meters within a tune. Another weakness: MiBAC permits only two chords per measure in 4/4 tunes and one in 3/4 tunes, but many jazz tunes use more, at least in spots.

But even as it stands, MiBAC is a superb tool for any Mac-owning student of jazz. If you want to learn to play against the changes, or to play the changes themselves in the first place, MiBAC is for you.—**Steve Cummings**

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SYSTEM REQUIREMENTS: System Tools 6.0.2. Supports MultiFinder. Operates on a Mac Plus or higher with 1 Mbyte. Hard disk is recommended.

Circle 206 on reader service card

Driving Simulation

THE DUEL: TEST DRIVE II

Pros: Great graphics and sound; car-freak's attention to detail; additional car and scenery disks available; sardonic manual. **Cons:** No color; keyboard used for acceleration and braking; key-disk copy protection scheme. **Company:** Accolade. **Requires:** Mac Plus. **List price:** $54.95; scenery and cars disks $21.95 each.

When you've been working too long at your Mac, you begin to catch yourself trying to open your gym locker by double-clicking it, instinctively scanning the tops of restaurant walls for the menus, or, after knocking over your coffee, you find yourself unconsciously typing ⌘-Z with your left hand. At that point, it's time for a break.

The Duel, a driving simulation from Accolade, is ideal for such situations. Created by a bunch of obsessive driving zealots, it seeks to re-create the look, feel, and hazards of driving in some of the most famous cars in the world.

Driving Ambition

The Duel is pretty much what you'd expect to find in a video-arcade driving simulator: you look through the windshield of a high-octane road machine. You accelerate by pressing keys and steering with the mouse, as mountains, trees, and assorted billboards whip past. You can either race against the clock, or—in the words of the program's consistently hip manual—you can "battle the relentless, icy cool driving hand of the computer." The object: to go as fast as your nerves can stand.

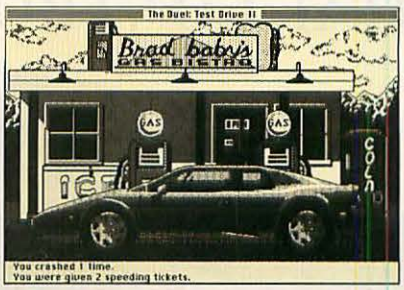
If you've played with Macintosh driving or flight simulators before, you're probably familiar with the typical pitfalls of such software. First, you find that the slightest movement of the mouse sends you careering wildly off course; only after hours of practice do you stop oversteering. Second, you eventually tire of the same routine and donate the game to someone for whom the novelty is still fresh.

The Duel is nicely different. For one thing, keeping your car under control isn't terribly difficult—and that's as it should be. Instead, you have much more realistic concerns: watching your fuel, passing other cars without smashing into oncoming traffic, and even avoiding getting speeding tickets. That's right, if you ignore the beepings of your radar detector, one of the game's snide highway police is sure to pull you over and slap a ticket on your windshield.

Better still, The Duel has eliminated the monotony factor by offering optional scenery disks, which provide you with glorious new highways to terrorize. The California Challenge disk is particularly well done, featuring giant redwoods that shoot straight up off your screen, some hairy hairpin roads, and even Welcome to . . . signs that mark the blurred passage of towns along the way. Getting tired of your Porsche 959 and your Ferrari F40? Well, *that's* not very realistic, of course; but if you do, buy a cars disk. The Supercars disk equips you with a stable of classic, high-priced status rockets from Lotus, Lamborghini and so on. The Muscle Cars disk offers you "five street-scorching legends from the 60s" (again, the manual's words): Corvette Sting Ray, Shelby GT500 Cobra, to name a couple. The cars differ in internal and external appearance, of course, but more importantly, they actually accelerate and handle differently and even make different sounds.

High Roads and Low Roads

After a few rounds of driving, you'll begin to accumulate favorite driving misadventures, each highlighting some clever touch within the program. For example, if you swerve off one of the winding cliff-edge roads, you're not greeted by a simple Game Over logo.



Brad Baby's
At regular intervals, you have to pull over for gas. If you get cocky and breeze by a gas station, The Duel will rub it in when your souped-up racer staggers to a halt. "Enjoy the walk home," it says with a smirk.

Instead, you get to view the sickening sight of the sheer cliff surface flying past as you plummet—and you see your windshield smash as you hit the ground. Or, if you forget to shift while cruising in your Lotus, you blow the transmission and a cloud of very expensive black smoke is visible in your rearview mirror.

Like any hopelessly ambitious program, The Duel has its disappointments. For starters, it's not in color—a maddening fact, especially since the screen pictures on the box and in the manual are in color (because they were taken from the Amiga version of the game). And even on a large monitor, the window doesn't get bigger than the classic Mac screen. And while we're quibbling, it would be much more natural to use the mouse button for acceleration instead of having to press letter keys. Finally, the program's critiques at the end of each round are duly cynical ("You might as well return the sports car and get a Volvo and a cocker spaniel!"), but there should be

(continues)

JOHN VALLIANATOS

The Duel driving simulation from Accolade, with the Supercars and Muscle Cars disks and the California Challenge scenery disk.

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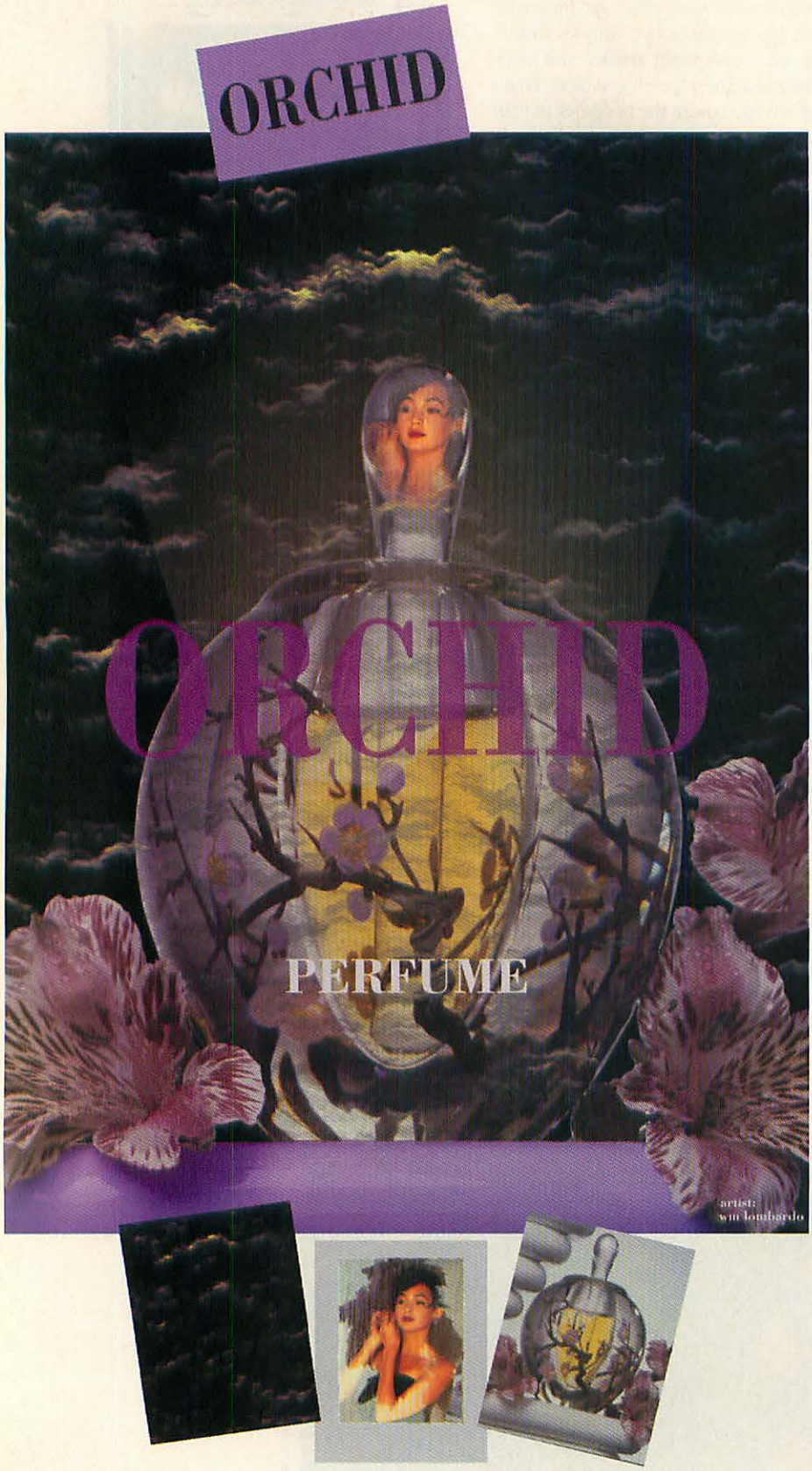

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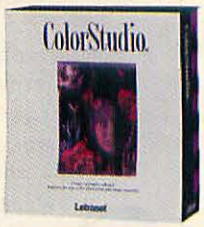

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a better variety of them—they're conspicuous as the only annoyingly repetitive aspect of the game.

Getting Up to Speed

But to gripe about these oversights in such a cleanly crafted game is like complaining that the wind from your Ferrari's open window is mussing your hair. Much better to sit back and floor it. The simulator's hard-disk installation scheme is a fair and not inconvenient copy-protection method, there's plenty of good digitized music and sound effects, and the graphics are neat. (You can even see the little suburban couple in the front seat of the oncoming van just before you plow into them.) What makes The Duel better than your average video-arcade game is its wit, its obsession with realism (you can read the full technical specs of every car), and the fact that it requires no quarters. Go for it—surely you've got time for a scream through Santa Barbara before your spreadsheet is due.—**David Pogue**

See **Where to Buy** *or circle 754 on reader service card.*

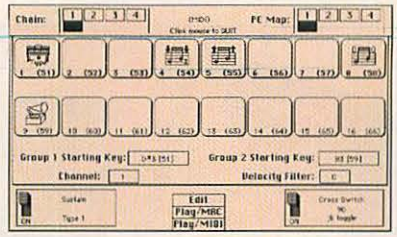
Real-Time Music-Performance Software

SYBIL 2.0

Pros: Allows percussionists and guitarists to perform in ways that wouldn't be possible otherwise; flexible, powerful, and fun. **Cons:** Difficult to master; poorly documented; slow; copy protected by two-copy hard disk installer. **Company:** Scorpion Systems Group. **Requires:** Mac plus; MIDI interface; multitimbral, multichannel MIDI sound source (synthesizer). Velocity-sensitive MIDI controller recommended. **List price:** $299.

At a party in a San Francisco art studio, I heard the alluring rhythms of a hot fusion combo in a crowded corner of the room. But when I got there, there was no band—only a drummer pounding on a panel connected to a Mac.

The percussionist was playing a Roland Octopad, a flat panel with eight pressure-sensitive pads that send MIDI signals to the Mac. A program called Sybil magically transformed those signals into more complex MIDI messages, which were then passed on to a Roland MT-32 synthesizer. The MT-32, unaware that it was receiving signals from just one drummer, responded by blasting out sounds of organs, pianos, horns, guitar, bass, and (of course) drums.



Sybil's Pads

Sybil's main screen can be made to resemble a drum-pad controller (shown) or a keyboard. Pop-up menus control many program options.

Sybil's Connections

To make Sybil sing for me, I installed the software on my hard disk with the supplied installer (Sybil is copy protected) and used a velocity-sensitive MIDI controller to pass MIDI messages to Sybil. (Sybil can be played from the Mac keyboard, but what's the point of using a keyboard like that to make music?) Most MIDI controllers are synthesizer keyboards, but you can buy MIDI horns, MIDI guitars, and MIDI percussion controllers like the Octopad. I decided on an Octopad II, a smarter version of the classic Octopad.

I connected the Octopad II to the MIDI-In port on my Mac's MIDI interface. Sybil could then electronically "hear" my Octopad drumming. To give Sybil a voice (actually, voices), I needed to connect the Mac's MIDI Out to a multitimbral, multichannel sound source, a device that can receive signals over several different channels and transform those signals into several different simultaneous instrument sounds. I tried a Roland MT-32 and Kawai K4.

Canned Sybil

Sybil comes with a few preprogrammed documents, called identity maps, which specify how incoming MIDI messages will be transformed. After a little experimenting with one of these canned maps using the Roland MT-32, Sybil and I were jamming. As I hit different pads, I'd hear different combinations of drum beats, sustained horn blasts, bass notes, and other sounds. Sometimes I'd get different sounds if I hit the pads harder; some pads cycled through different sounds if I hit them repeatedly. One pad caused everything to modulate up a half step; another pad caused everything to modulate through a downward cycle of notes; a third pad returned all the pads to their original key.

When I substituted the Kawai synth, the playing stopped—at least for a while. Because of limitations in the current MIDI standard, canned Sybil maps for the MT-32 don't work with synths from other companies. In order to make Sybil work with my Kawai, I'd need to modify those maps or create my own.

Sybil Construction Set

Creating a map with Sybil is, in some ways, like designing your own musical instrument. When connected to the right hardware, Sybil offers almost unlimited choices. But Sybil's nonintuitive, multiwindow user interface doesn't make it easy to use all of these options (see "Sybil's Pads"). Unfamiliar icons, strange technical terms, and cryptic matrices are likely to make you reach for the manual when you first launch Sybil.

Unfortunately however, Sybil has inadequate documentation. The booklet contains lots of information, but it is poorly organized and far from complete. The documentation desperately needs a clear tutorial section to guide newcomers through the process of creating and using Sybil patches. (At press time Scorpion had completed a pair of simple setup tutorials—one for percussion, one for guitar. More tutorials are in the works.)

The Beginnings of Sybilization

Sybil is groundbreaking software; it allows free-thinking drummers, guitarists, and other musicians to perform with their instruments as they never could before. For solo or combo work, there's incredible potential here.

To capture the imagination of the typical, nontechnical musician, though, Sybil needs better documentation, a large library of canned maps for popular synthesizers, and some user-interface polishing. But even in its current state, it's a must for any computer-wise drummer or guitarist who's willing to invest time and energy in order to explore new electronic territory in performance.—**George Beekman**

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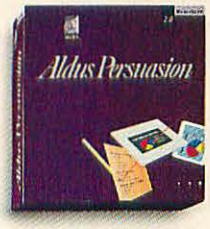

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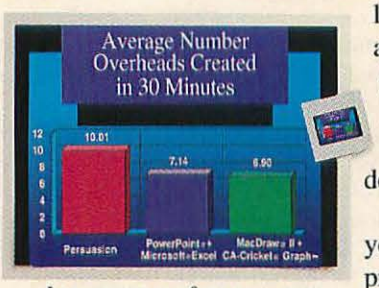

In a recent performance test, Persuasion outpaced other Macintosh programs.

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CASE Tool

ARANDA 1.0.1

Pros: Easy to use; nonintrusive; methodology-independent; graphic and textual reports and views. **Cons:** Doesn't recognize conditional compilation directives; limited to Pascal (and Object Pascal) source code; no batch operation; documentation is a little terse. **Company:** Soft-Set Technologies. **Requires:** Mac II; 2MB RAM; hard disk with free space equal to at least four times the size of the source code to be analyzed. **List price:** $645.

Computer-aided software engineering (CASE) encompasses a broad range of activities, from such tools as source code reformatters through application generators and prototypers to complex design and scheduling tools. Anything that assists developers in the production of stable, maintainable (and, hopefully, reusable) code qualifies as CASE. High-end CASE tools such as code analyzers, usually associated with the minicomputer and mainframe markets, are still somewhat rare in the personal computer industry.

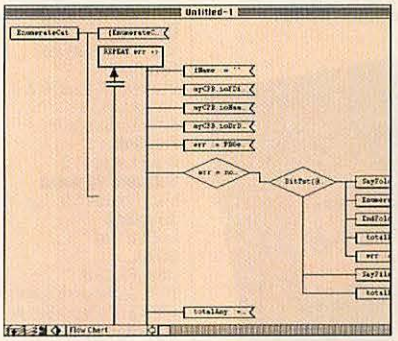
Aranda definitely falls into the high-end category but addresses the issues of source analysis and documentation in the way that one would expect of a Macintosh program. Aranda assists in the design, analysis, and documentation of Pascal, and Object Pascal, source code. Through graphic, textual, and hypertextual views, tools, and links, you can easily create reports that range from flowcharts of procedures to a general overview of the code.

Still Evolving

Aranda, however, is not a panacea. This first release is fast, useful, and shows promise, but it does have limitations. (I was, however, quickly able to navigate the source to a rather substantial body of code that was new to me at the time—the Art Class example that comes with THINK Pascal 3.0 and the associated THINK Class Library.) One limitation is that Aranda only recognizes the Object Pascal dialect, which is implemented by MPW, THINK, and TML Pascal. It doesn't recognize conditional compilation directives, which can occasionally lead to some incorrect conclusions. According to Soft-Set, the next version will recognize these directives and will also be available for C and C++ programmers.

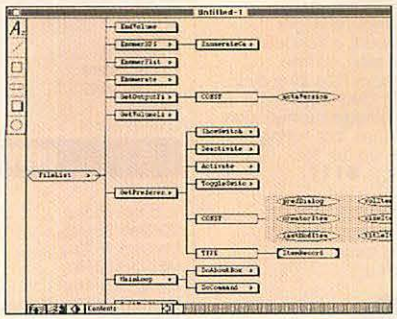
The code-analysis tools in Aranda are context-sensitive, in that they understand the identifier scoping rules of Pascal. Thus when you request a report on a variable, you don't receive a report of all the other variables with the same name. Aranda automatically creates a number of standard reports, and you can create your own reports, or modify the preexisting ones, in a fairly simple drawing environment. Unfortunately, in this release you have to generate your reports one at a time. You cannot select all, or select a set of like objects, and request a report. This needs to be resolved, as the inconvenience makes perusing and documenting substantial bodies of preexisting code quite tedious.

Aranda requires at least a Mac II–class machine with 2 or more megabytes of memory and a hard disk. The amount of free space needed on the hard disk varies from project to project, but you typically need about four times as much as the space consumed by source code—a 100K source project will require about 400K of disk space. While not required, a large-screen monitor will reduce the amount of scrolling necessary to view charts you have produced. Some other minor complaints include the fact that to change Aranda's on-screen fonts you need to use ResEdit on the Aranda application (but this is documented); there is no shrink-to-fit capability for some of the larger reports; and the flowcharts clip text, forcing you to leave the flowchart view to see the full statement or expression.



Follow the Flow

Aranda lets you look at the source to your procedures as text or, as shown, in flowchart form.



Getting an Overview

The Contents report shows procedures, functions, types, variables, and constraints in a module.

The 86-page user guide contains a good introduction, a simplistic tutorial, and a terse reference section. In the introduction, Soft-Set frankly discusses some current limitations and future enhancements such as support for C and C++; multiple report windows; source editing within the environment; and testing tools. The tutorial deals with a simple, single-file example, the UTemplate.pfile from MacApp, and not with techniques for managing multifile projects. Soft-Set is, however, sending out application notes to registered users—case studies of real-world development and maintenance problems using Aranda. These notes are helpful, but the documentation should address how Aranda might be used in a setting similar to one that you (the projected customer) might encounter. Soft-Set also solicits user feedback to help refine the interface and define the future directions of Aranda.

Aranda's support policy is unusual for a Mac program but common in the mainframe world. Soft-Set offers free 30-day technical support and free updates for the first year. After 30 days, support costs $150 a year but includes all updates. Technical support is available via phone, fax, or AppleLink.

Wrapping Things Up

Aranda is targeted at professional programmers doing either in-house or commercial development. It is a capable tool that produces useful reports, but it needs work in areas involving user interaction. The responsiveness and commitment shown by Soft-Set Technologies indicate that Aranda will continue to mature.—**Dennis Cohen**

See **Where to Buy** *or circle 714 on reader service card.*

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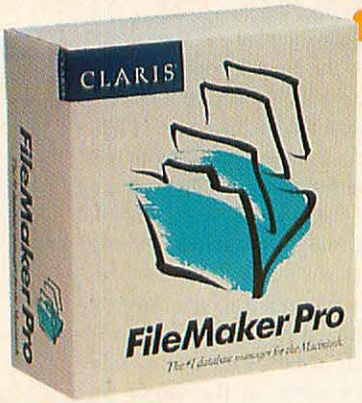

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(Claris Corporation)
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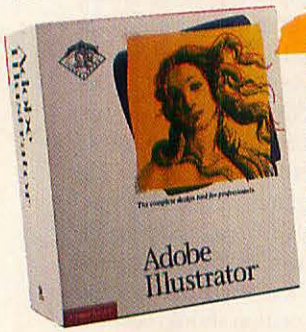
(CalComp)
WIZ delivers mouse features as well as the ability to draw and trace with 1000 dpi accuracy and absolute positioning. Define macros, minimize wrist movement with adjustable pad scaling. Use over 19 optional software templates to by-pass pull-down menus, making command selection a one click process. Requires Mac SE/II. 5 year mfg. warranty. WIZ tablet **$159.** Optional templates available. **$19.** Optional 2 button pen **$57.**

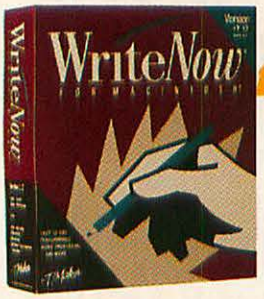


Adobe Illustrator 3.0

(Adobe Systems, Inc.)
The page creation and layout solution! Features include technical illustration, freehand sketching, automatic scanned image tracing, blending tools and more. New text-handling tool allows direct, on-screen entering and manipulation of text. The new graphics tool lets you automatically create, manipulate and customize presentation quality charts and other graphics. Includes FREE copy of Adobe Type Manager. **$349.**

FastTrack Schedule 1.5

(AEC)
FastTrack Schedule produces Gantt charts in outline format. Open them up to see more detail or collapse them to see the Big Picture. It won't take up your time with complicated setup and extensive data entry. But it will print informative charts with graphics showing progress and milestones reached. It supports color on the Mac II, ImagewriterII or LQ. **$139.**



WriteNow 2.2

(T/Maker)
Incorporates many new user-requested functions, such as mail merge, a larger dictionary, cursor key support, a Windows Menu, dedicated decimal tabs, a Hide Pictures option, ability to save files directly in text only, MacWrite, or RTF (word option) formats. Power features include hyphenation, horizontal scrolling, automatic foot-noting and guttering. Can display up to four columns simultaneously. **$117.**

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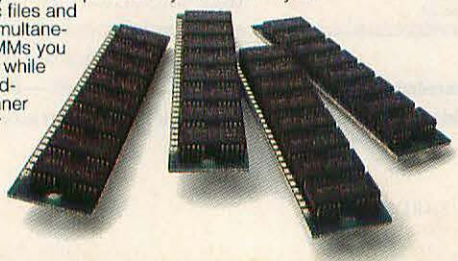

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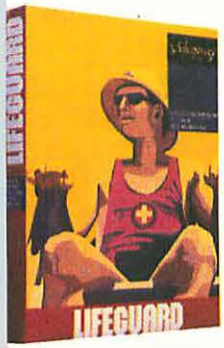

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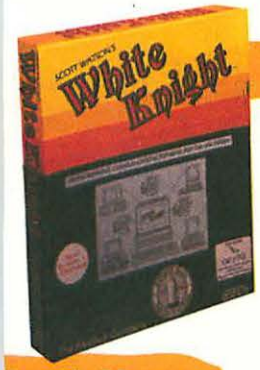

White Knight 11

(FreeSoft)

New features include a reworked user interface and completely reorganized menus. Its enhanced terminal supports the VT-102, ZModem protocol and more versions of XModem and Kermit. It's MultiFinder compatible and supports both color QuickDraw and large monitors. Get a *free* subscription to GEnie and a *free* copy of Okyto (Mac-to-Mac file transfer program) with each copy of White Knight. **$85.**

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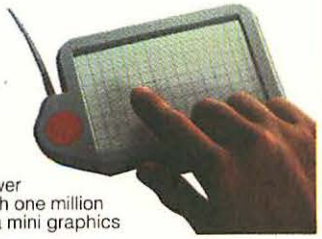

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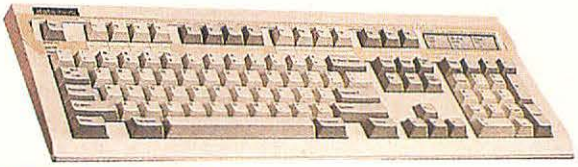

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WINDOW SHOPPING

by Lawrence Stevens

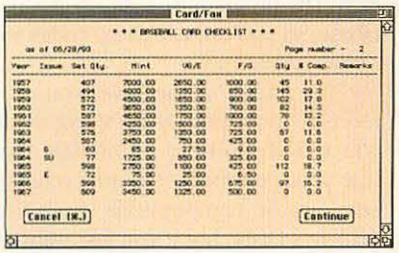
This month I review four programs that help you enjoy your hobbies and sports

Card/Fax 2.0

When I was growing up, most kids had very little spending money. Our primary media of exchange in those days are now considered collectibles: baseball cards, comic books, marbles, bottle caps. We used them for bartering, gambling, bribing, or blackmailing.

Baseball cards were particularly good because they fit into your back pocket, and even though they all cost the same amount (five cards plus bubble gum for a nickel), individual cards had different values. The value was based on the prevalence or scarcity of the card, and the popularity of the player pictured. In 1958, for example, a Hank Aaron card could easily be worth five cards with lesser players. And any kid would gladly trade his entire stack of duplicates for a Mickey Mantle card. That coveted '58 Mantle card now goes for as much as $500.

Back then I used a checklist card that named all the cards in the set to help me track my collection as it grew. Now that sports-card collecting has become big business, it's inevitable that tracking a collection should become more sophisticated. Card/Fax ($95 from Compu-Quote) is a sports-card database that lets you use a Macintosh to organize your list of cards. This program is for Topps baseball cards, but Compu-Quote also makes databases for 12 other types of sports cards including those from Donruss, Fleer, Score, and Goudey. (Compu-Quote also has software for tracking stamps, coins, and comic books. But Marvin Mallon, the company's president, says those programs were ported from MS-DOS and as yet lack a Macintosh interface. He hopes to fix that problem by early next year.)



Striving for Completeness

This Checklist in Card/Fax lists the number of cards in each year's set, the retail value based on three condition ratings, the number of cards you own, and the percentage of the set that you own.

RON CHAN

Card/Fax lists all the Topps cards from 1948 to the present. The list includes card numbers, player names, and market value. Yearly updates, which include listings for newly issued cards as well as updated prices, are available for $25.

When you obtain a new card, you just type the card year, number, condition, purchase price, where you're storing the card, and from whom you bought it. The program then completes the entry by entering the player's name and the current retail value of the card.

Once you've input all your cards, the program generates reports that help you manage your collection. For example, it can figure your profit and loss by calculating the total cost of your collection and subtracting the total current retail value. It can print a Want List that includes the cards you're missing for any year. The program also generates a Checklist report (see "Striving for Completeness") and a Cards Sold report.

The main problem with Card/Fax is that it is hard to find an individual card unless you know the Topps number and year. There is no search function that lets you locate a card by player name or by team.

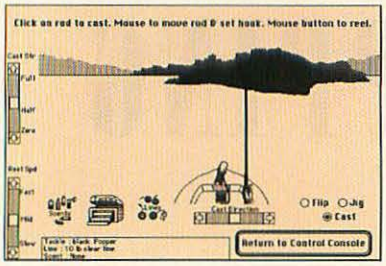
Still, if your collection is large and you want to manage it in a professional way, Card/Fax does a good job. Besides, there is no real alternative. Even though you could create a similar database using a spreadsheet or database-management system, I wouldn't recommend it; Card/Fax contains information for 28,000 cards.

Bass Champ 1.1.1

One of the joys of collecting sports cards is that you can daydream about the game even when there is no game. Similarly, if your sport is fishing, Bass Champ ($49.95 from Shadowfax Software) gives you a way to cast your line even when you can't get to the lake.

Bass Champ starts with you inside a boat. Using on-screen controls, you start the engine, ease forward on the throttle, and navigate your way around Lake Stikapig. When you find a likely place, stop the engine and begin fishing. Click on the rod to cast, jig, or flip your line. If you get a nibble, use the mouse to control the movement of the rod and reel, being careful not to lose the fish or break or tangle the line (see

(continues)



Gone Fishing

You use the mouse to manipulate the rod and reel in Bass Champ. The Lines, Tackle, and Scents icons bring you to screens where you can choose your equipment. Reel Spd (Speed), Cast Str (Strength), and Cast Direction are controlled with scroll boxes.

"Gone Fishing"). At the end of the session, the program tallies your catch.

If you're not interested in real fishing, you'll probably quickly grow bored with Bass Champ. The animations are attractive but limited to only a few scenes. But for the serious angler who wants to learn more about the sport, this program can be a real asset.

There is a lot more to fishing than manipulating a rod and reel. You have to decide on the best place to fish; the optimal line; the best lure; and whether to cast, flip, or jig your line. Lake Stikapig must be fished like a real lake. You choose the most likely fishing spot by consulting a topographical map and an on-screen depth indicator. (Good bass fishermen look for changes in depth that might indicate a bass-attracting structure.) You choose from 20 different lures (each of which is pictured), 39 different lure colors, 6 lure scents, 12 line weights, and 6 line colors. You can also indicate the cast strength and the reel speed. Each decision affects your success.

If you're looking for video-game thrills, Bass Champ will disappoint you, but it's an excellent way to improve your fishing.

The Athlete's Diary 1.1

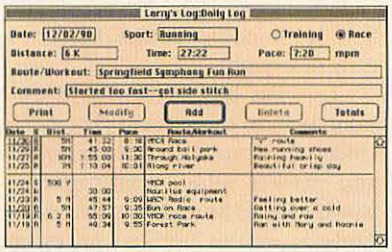
Six or seven years ago, when the jogging, swimming, weight-lifting, and aerobics fitness craze first hit, many of us became converts. We even kept training logs, some of which were very creative. One friend tracked his daily running mileage on a United States road map. Beginning on the East coast he extended a westward line on the map representing the number of miles he ran each day. His goal was to reach San Francisco within one year.

We still work out regularly, but much of the thrill is gone. But if you're a serious athlete who wants to track your training and competition statistics, The Athlete's Diary ($39.95 from Stevens Creek Software) might be just the program for you.

You can keep information on up to nine different sports. For each sport you specify the units, if any, such as miles, kilometers, or meters, and the pace, such as minutes per mile or kilometers per hour. You enter the date, sport, distance, and time for a training session or competition, and the program automatically calculates your pace (see "Tracking Your Training"). There are also two free-form fields: Route/Workout and Comment:

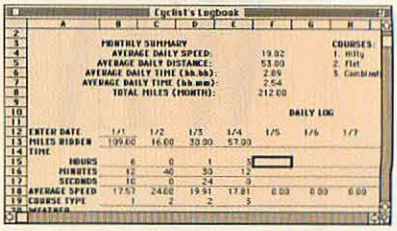
You can view a sequential listing of all your training sessions and competitions, but more important, The Athlete's Diary generates reports that help you understand how you perform under different conditions. For example, you can view the training sessions in which your Comment or Route/Workout field contains a hot and muggy or a hilly route to see how those conditions affect your pace. Or you can display only training sessions in which you exceeded a given pace. The program also displays tables and charts that show total distance, average distance, and average pace for a specific time period.

For the money, The Athlete's Diary is surprisingly complete and works surprisingly well. This program is for serious athletes or for people who want to pretend they are.



Tracking Your Training

The Pace field is calculated by the program. After clicking on the Add button, the event is added to the Daily Log, shown at the bottom of the screen. The Select menu allows you to view only records that meet certain criteria. For example, you can view only races or only training sessions.



Plotting Your Pedaling

Cyclist's Logbook is a fairly straightforward spreadsheet with which you can keep track of your bicycle training sessions. In rows 13 to 17, you enter your distance and time. Your average speed for each training session is calculated in row 18, and your average speed and time for the entire month (or other time interval that you specify) are calculated in column F.

Cyclist's Logbook

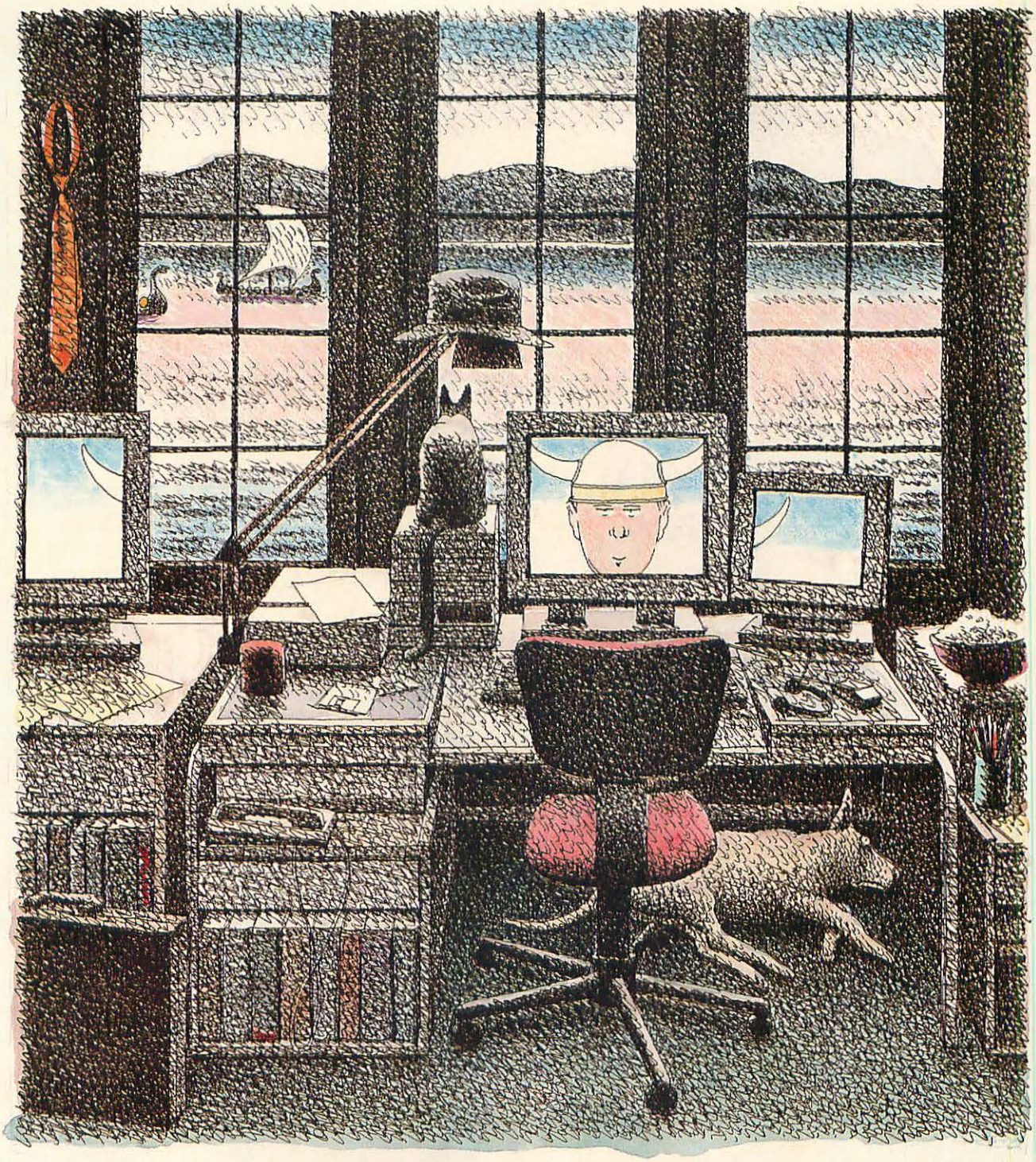
While users of Card/Fax would find it difficult to duplicate the program's mountain of data, anyone who has spreadsheet or database-management software and the expertise to program it can replicate the functions in The Athlete's Diary relatively easily. As an Excel instructor, my guess is that it would take an intermediate Excel user (someone who knows all the menu items and 10 or so functions) about two hours to develop the program.

An alternative would be to use Cyclist's Logbook, a basic Excel template ($10 from Heizer Software) that actually works for any sport that measures distance. You input each day's distance and how long it took. The program calculates your rate and summarizes your average daily speed, average daily distance, average daily time, and total miles (see "Plotting Your Pedaling").

The program lets you type in codes that represent the weather; the terrain; your attitude; and the type of workout, such as interval, hill repeats, or race. The program isn't set up as a database, so you can use these codes for a criteria search.

The Athlete's Diary gives you a lot more reports, but Cyclist's Log saves you $30. If you need to carefully analyze your performance during training sessions or competitions, buy The Athlete's Diary; but if you just want to know your distance and pace, Cyclist's Logbook is more cost-effective. M

See **Where to Buy** *or circle 719 (The Athlete's Diary), 726 (Bass Champ), 731 (Card/Fax), 744 (Cyclist's Logbook) on reader service card.*



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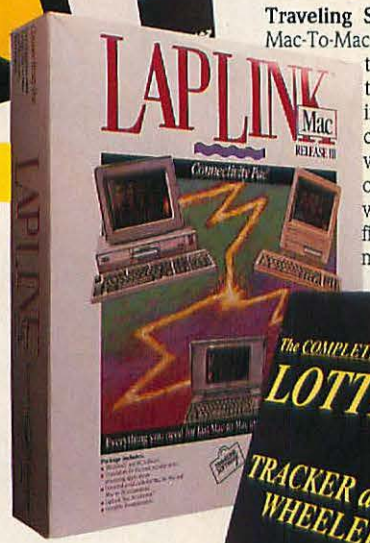

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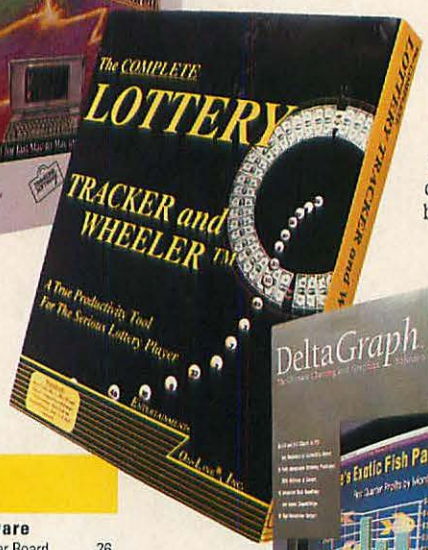

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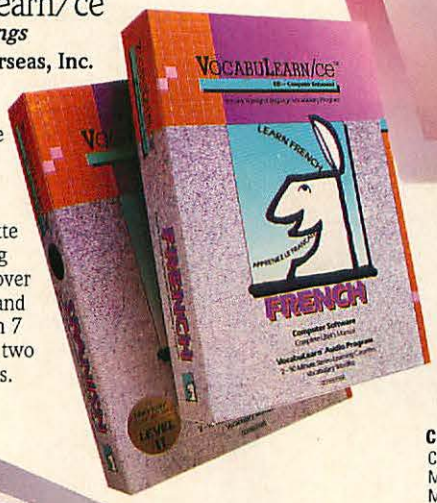

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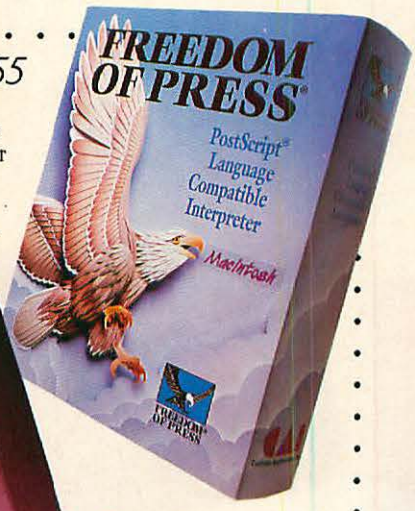

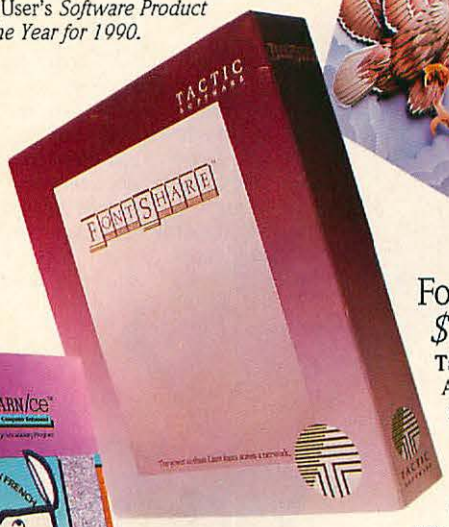

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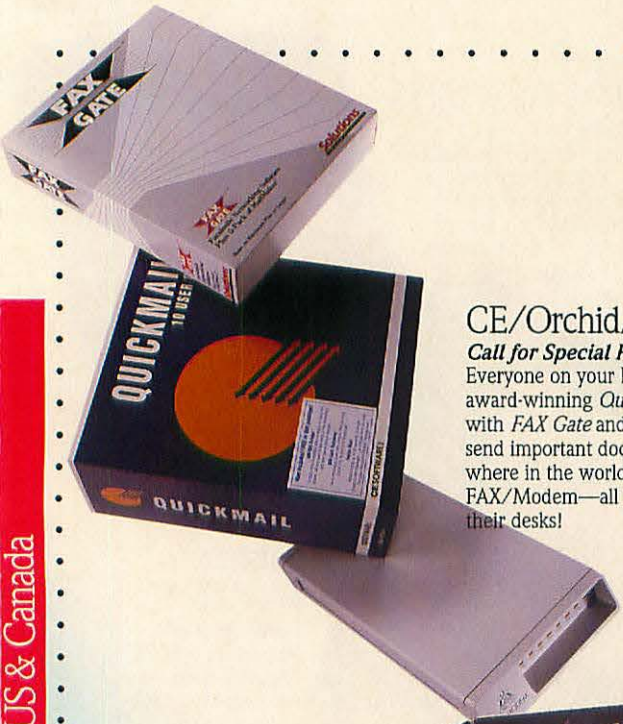

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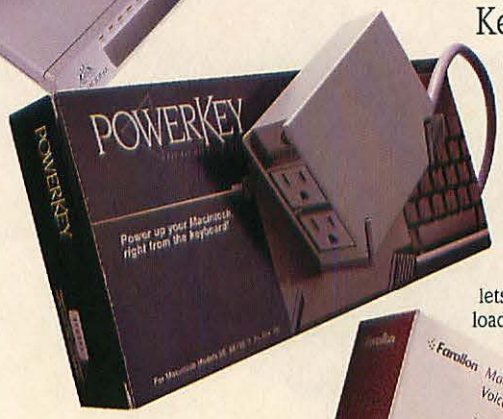

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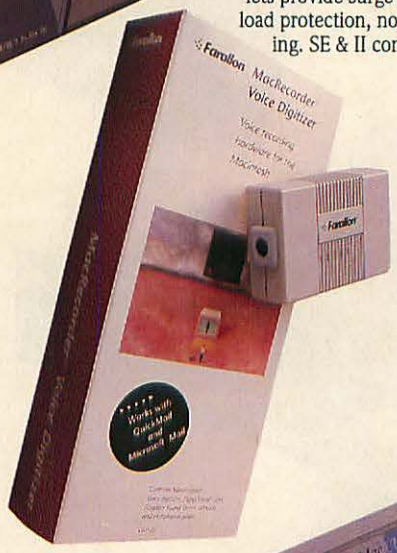

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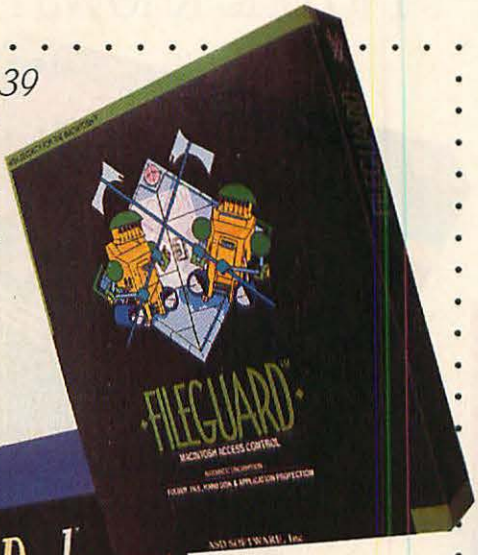
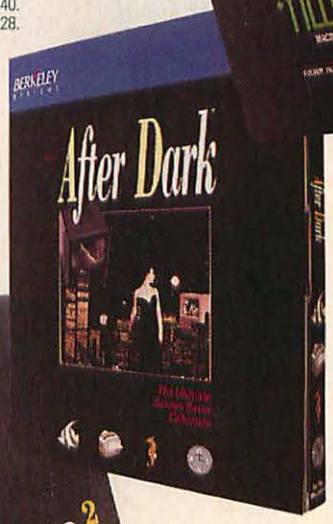
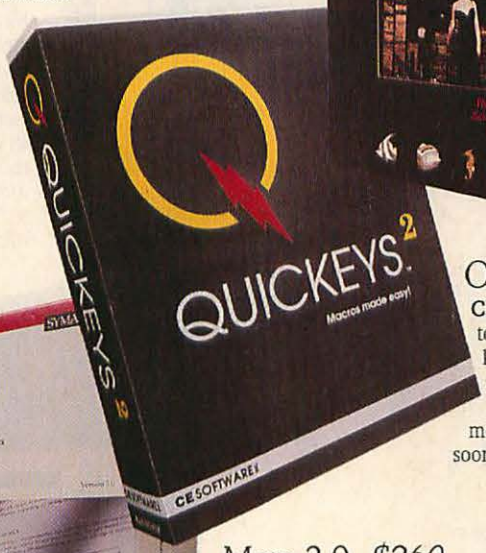




After Dark 2.0 *$20.00*

Berkeley Systems New! Over 30 displays and sound. Ticking clocks, thunder, munching worms. Plus company logo, messages, fish, flying toasters and MultiModule. Random display and password sleep. "...the Ferrari of screen savers" — *MacWeek.*



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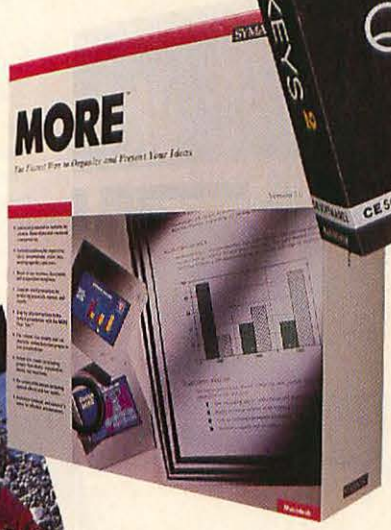

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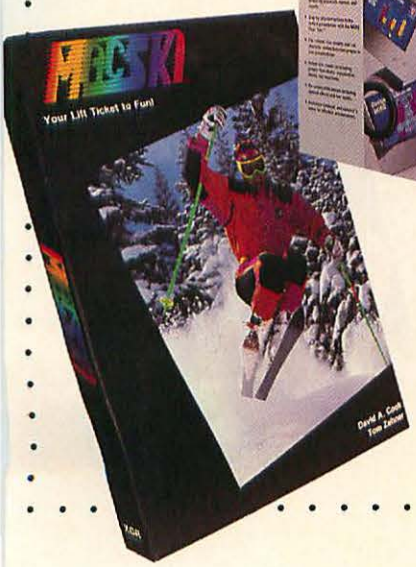

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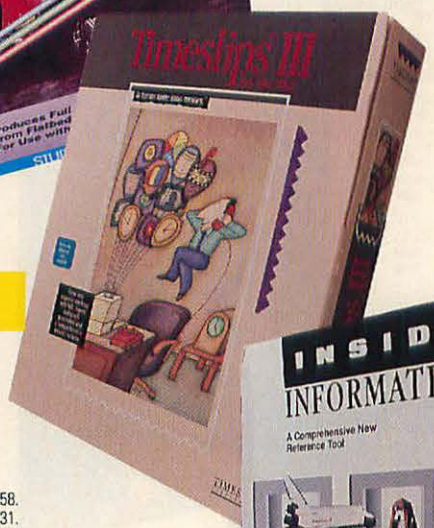
Studiotronics Revolutionary product that lets GS scanners scan color images, edit, and save color images as 8, 16, or 32 bit PICT and color TIFF files. Comes with ShowScan™ XCMD for HyperCard that displays color images in stacks.



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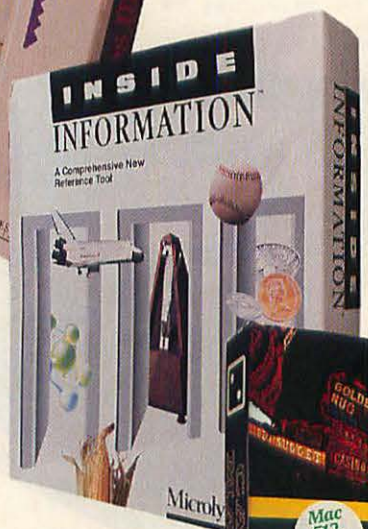

Inside Information *$68*

Microlytics Use this innovative program to brief yourself on a topic before going into a meeting, shed light on an idea for writing a career building memo, or simply amaze everyone with insightful knowledge.

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Centron Craps, roulette, blackjack, or poker—straight from the big casinos to your mouse. Count cards or choose the rules of your favorite casino. This is the one that lets you play *your* way.

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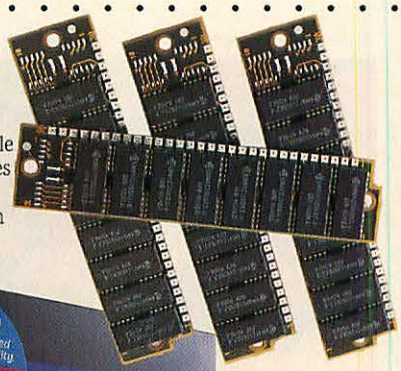

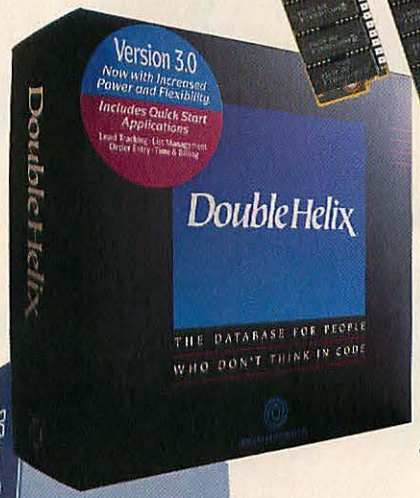

Double Helix 3.0 *$335*

Odesta The only database program that speaks the Macintosh language you know—with no programming syntax to slow you down. Enables anyone without technical skills to create customized applications quickly.

Multiledger • Cash Ledger • Payroll *Check Listings*

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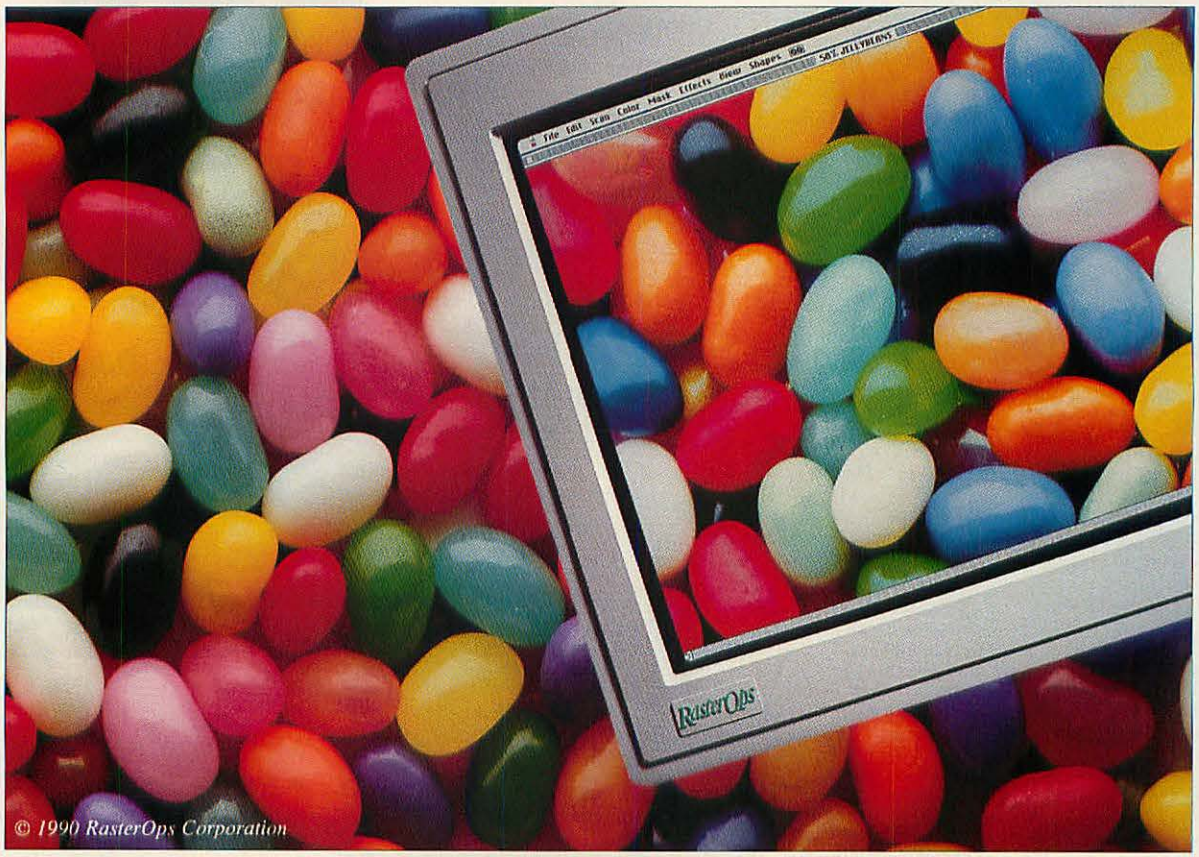

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Quick Tips

RESTRICTING FILE SERVER USE, ADJUSTING KEYBOARD TILT, ENVELOPE PRINTING ON IMAGEWRITERS, AND MORE

BY LON POOLE

You can revise an EPS graphic placed in Aldus PageMaker even without the original graphic, as explained in the August column. First you export the graphic using PageMaker's Print command. Then you revise the exported graphic using Illustrator 88. Finally you place the revised graphic back in PageMaker. However, *Macworld* contributing editor Steve Roth cautions that this method works only with graphics created in Illustrator. It's the only program he knows of that can save what he calls editable EPS. No program can open EPS files created with FreeHand, for instance—not even FreeHand.

Memory Error

In August I correctly quoted Steve Sawyer of CJS Systems saying a Mac Plus can directly use at most 4MB of RAM, but I gave the wrong reason. It's the Mac Plus ROM that limits the amount of RAM to 4MB, not the 68000 microprocessor, which can access up to 16MB. Sawyer also noted that you can indirectly use another 2MB of RAM—for a RAM disk—by installing a Mac Rescue board (from Computer Care, 612/371-0061 or 800/950-2273).

Server Abuse

Q Our network users tend to use up all available space on the AppleShare server disk. Can we restrict the space available in a folder on the server so as to better manage the network?

Randall G. Bock
University Park, Pennsylvania

A I know of no way to restrict folder size, and neither does *Macworld*'s network administrator. However, with utilities like Hard Disk Partition (FWB, 415/474-8055) or MultiDisk (AlSoft, 713/353-4090), you can partition a hard disk into multiple volumes, each acting like a separate disk. You set the maximum size of a volume when you partition the disk.

Partitioning has other advantages, especially in a networked environment. The contents of a partitioned disk are more secure because one volume can be damaged without affecting other volumes. Partitioning enhances a high-capacity drive's performance, partly because the Finder more efficiently handles volumes with fewer than 2000 files and partly because smaller volumes are less subject to fragmentation.

There are many ways of allocating volumes on the server. You could give each user a separate volume. Or, you could assign each volume to a different task—E-mail, application programs, shared documents, and so on. You could even combine those methods, using some volumes for common activities and dedicating others to specific users. Keep in mind, however, that Mac system software normally limits the number of mounted volumes (those with icons on the desktop) to seven. Floppy disks and unpartitioned hard drives count as one volume each. Most partitioning software allows you to increase that limit, though every additional mountable volume uses about 300K of memory.

Monitor Fight

Q My Apple 2-page monitor flickers when I use it with an Apple 13-inch color monitor. Is this a known problem and is there a fix?

Daniel Vallée
Rivière-du-Loup, Québec

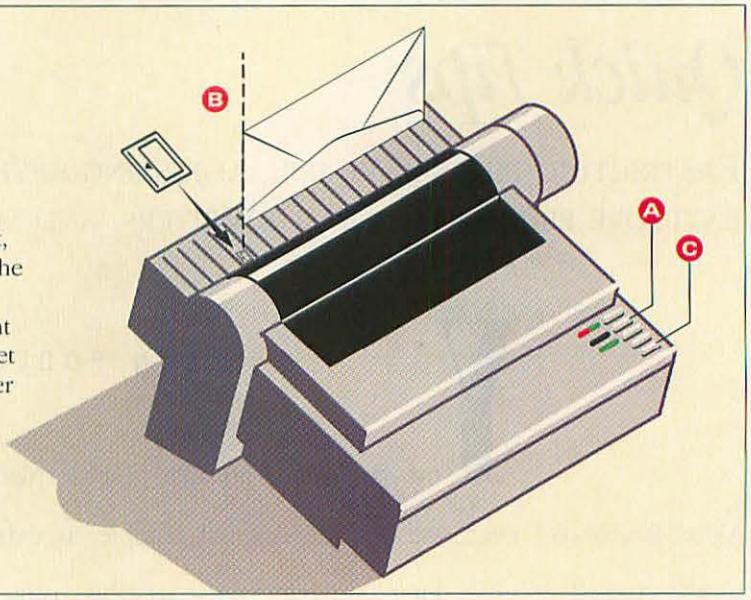
A You can eliminate the flicker by moving the two monitors farther apart. A similar phenomenon occurs if you use an Apple full-page monitor with an Apple 13-inch color monitor. If the monitors are closer than 6 inches, one (sometimes both) will flicker.

Flicker occurs when the electric and magnetic fields generated by one monitor clash with those generated by a nearby monitor. All monitors radiate these fields as a byproduct of scanning the image on the picture tube, and the scanning rate determines the frequency of the radiation (see "The Magnetic-Field Menace," July 1990). The AppleColor High-Resolution RGB Monitor scans at 35kHz horizontally and 66.7Hz vertically, the Apple 2-page monitor scans at 68.7kHz horizontally

(continues)

ENVELOPE FEEDING

Instead of using the platen knob to crank an envelope into an ImageWriter II, use the printer's Form Feed/Paper Load button. First, press the printer's Select button to turn off the Select light **(A)**. Place the envelope in the printer upside down with the flap facing front and the left edge aligned with the single-sheet icon **(B)** on the back cover of the ImageWriter II. Then press the Form Feed/Paper Load button **(C)** to feed the envelope into the printer. Press the Select button again to turn on the Select light and you're ready to print.



and 75Hz vertically, the Apple full-page monitor scans at 68.85kHz horizontally and 75Hz vertically.

ImageWriter Envelopes

Q How can I use my ImageWriter to print an envelope without buying a $50–$60 software package?

Vern Coffey Jr.
Marblehead, Massachusetts

A Here's an easy method for printing #10 business envelopes on an ImageWriter. Create a new document using any word processor. Use the Page Setup command (File menu) to set the No Gaps Between Pages option. Leave the orientation set for portrait printing (not sideways printing) and the paper size set for US Letter.

How you set your margins depends on whether you want to print a return address. If you do, make the top margin 0.375 inches and the left margin 0.5 inches. Leave about five blank lines between the return address and the recipient's address, and indent the recipient's address about 4 inches. If you don't want to include a return address, make the top margin 2 inches and the left margin 4 inches. Either way, make the right margin 1 inch. The bottom margin doesn't really matter.

You may want to create a standard envelope template into which you can paste the address from a letter. After printing, close the template without saving, since pasting the address is only a temporary change to the template.

When you use the Print command (File menu), select the Hand Feed option. Adjust the paper-thickness lever inside the printer's front cover to accommodate the envelope, which is thicker than a sheet of paper.

Instead of using the platen knob to crank an envelope into an ImageWriter II, use the printer's Form Feed/Paper Load button as shown in "Envelope Feeding." First, press the printer's Select button to turn off the Select light. Place the envelope in the printer so its left edge aligns with the mark on the back cover of the ImageWriter II. Then press the Form Feed/Paper Load button to feed the envelope into the printer. Press the Select button again and you're ready to print.

Continuous Underlining

Q In documenting reliability studies for my employer I need to underline whole formulas, which include superscripted and subscripted text. All the various underline styles available in Word, MacWrite, and WriteNow produce a broken underline, higher than normal under a superscript and lower under a subscript. Here is an example of what I don't want:

$\underline{5 \times 10^{5}}$ $\underline{\text{and } P_2 O_5}$

Other than resorting to page-layout or draw programs, do you know of a way to get a continuous underline?

Renato Tolentino
Sunnyvale, California

A Use the Borders option of Microsoft Word 4.0's Paragraph command (Format menu), as described in the Word manual (look under the topics Borders and Forms). You'll probably have to adjust the left and right indents for the paragraph that contains the formula, so the border doesn't extend into the blank space alongside the formula (see "Solid Underline"). This method works only if the formula is alone in a paragraph or alone in a cell of a Word 4.0 table.

Two-Speed Scrolling Menus

TIP: When a menu is too long to fit on the screen, the Mac automatically makes it a scrolling menu, scrollable at two speeds. To scroll, one item at a time, pull down the menu and place the tip of the pointer just above the base of the arrow at the bottom of the menu. To scroll at high speed, move the pointer to the tip of the menu arrow (see "Scroll Throttle").

Barry J. Silver
Bethlehem, Pennsylvania

Only with 68030 machines do you get two speeds; 68000 and 68020 Macs perform only high-speed scrolling.—L.P.

Before or After

TIP: To quickly and easily add text to the beginning or the end of an icon name, use the arrow keys. First select the icon whose name you want to modify. Then press the left-arrow key

(continues)

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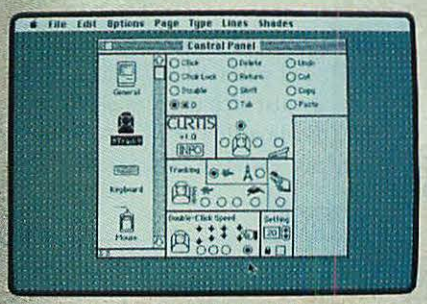

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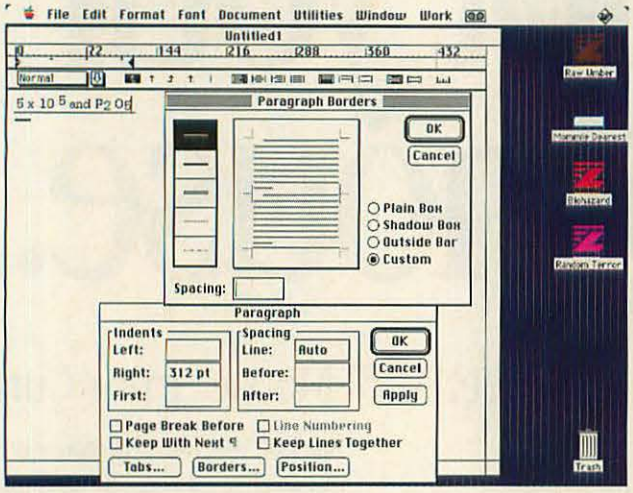


Solid Underline
To underline text containing subscripts and/or superscripts, as shown in this Microsoft Word document window (upper left), put a border line under the paragraph. Also, reset the indent markers in the paragraph's formatting ruler to the width of the equation.

once to move the blinking insertion point to the beginning of the name or press the right-arrow key once to move the insertion point to the end of the name. If no insertion point appears when you press an arrow key, the file is locked. To unlock it use the Finder's Get Info command (File menu).

Barry J. Silver
Bethlehem, Pennsylvania

Once you've positioned the insertion point, you can move it to the beginning or the end of the name by pressing the up arrow or the down arrow.—L.P.

Keyboard Tilt Adjustment

TIP: Do you find, as I did, that your wrists must arch unnaturally to use the Mac keyboard? Here's a solution you can put in place faster than you can say "carpal tunnel syndrome," and for a total cost of less than a dollar.

Go to any stationery store and buy a paper-wrapped vinyl eraser made for drafting film (Faber Castell no. 1960 or equivalent). Cut off two lengths of the eraser—about 1 inch each for the standard keyboard or ½ inch for the extended keyboard—and peel a small amount of the spiral-wrap paper from one end of each. Now turn the keyboard upside down and insert the paper-wrapped ends into the holes near the back corners of the keyboard. A perfect, snug fit! Right the keyboard and the exposed vinyl ends become nonskid feet, while the keyboard is now tilted toward you at a convenient and wrist-saving 20-degree angle.

Kevin McKeown
Santa Monica, California

This tip does not work on a Mac Plus keyboard because it has no holes on the bottom. Also, Apple's new Extended Keyboard II has a lever that lets you adjust the keyboard angle.—L.P.

Conserving Portable Power

TIP: On those days when I know that my Mac Portable will not see a power outlet all day, I reduce use of its hard disk (a major power consumer) by keeping Microsoft Word in memory. First I use the Finder's Get Info command (File menu) to increase the Application Memory Size setting for Word to 1000K. Then, using Word's Preferences command (Edit menu), I set the Program in Memory and Keep File in Memory options. I also set the RAM Cache option in the General Control Panel (Apple menu) to 128K.

Peter Kluijtenaar
Rotterdam, the Netherlands

Rapid Initializing

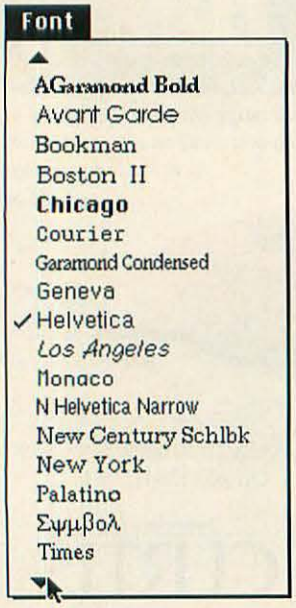
TIP: When initializing (formatting) a number of floppy disks in a row, ejecting them by dragging their icons to the Trash can be very time-consuming. Instead, press ⌘-Shift-1 or ⌘-Shift-2 (depending on which drive you are using) while the Macintosh is initializing each disk. When initialization is finished, the Macintosh ejects the disk without ever mounting its icon on the desktop.

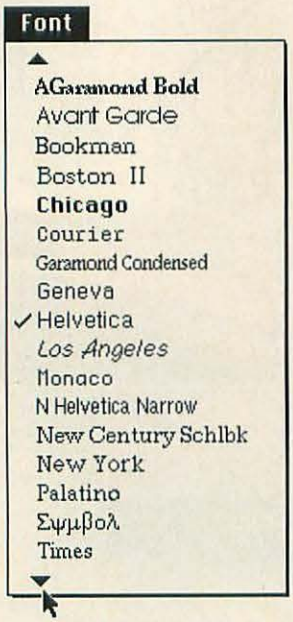
Jimmy Sun
Chicago, Illinois

New Home

TIP: Using a resource editor such as Apple's ResEdit, you can change the name of HyperCard's Home stack to anything you like. I use this technique to create my own Home-stack replacement. Start by making a copy of the HyperCard program (you don't want to experiment with the original). Open ResEdit and use it to open, in succession, the copy of HyperCard, HyperCard's STR# resources, and STR# resource number 1001. Change the first string in that resource from Home to the name you want, as shown in "Your Home." Then quit ResEdit, answering Yes when it asks whether you want to save changes. When you open the altered copy of HyperCard, you'll see your stack instead of the

(continues)





Scroll Throttle
Menus whose contents don't fit entirely on screen can be scrolled slowly by pointing at the base of the menu arrow (left) or quickly by pointing at the tip of the menu arrow (right). (Note: Only 68030 machines provide dual-speed menu scrolling.)

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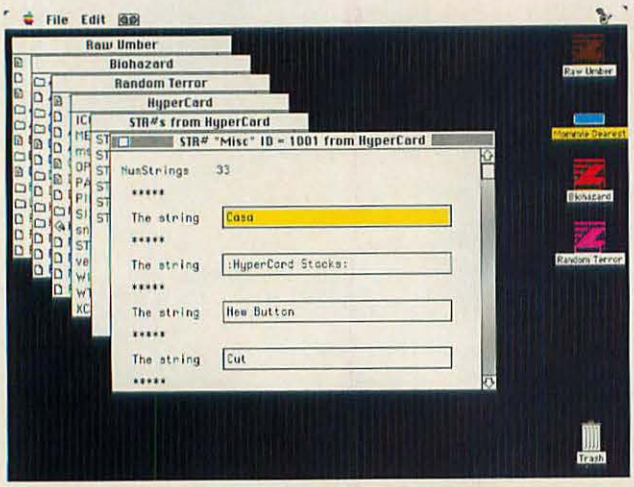

Your Home
You can use a resource editor like Apple's ResEdit to change the name HyperCard uses for its Home stack. Here the name has been changed to Casa.

standard Home stack.

Ryan Rasmussen
Monticello, Minnesota

Whoa! There are legitimate reasons for renaming the Home stack to suit your purposes, such as foreign language translation or an uncontrollable loathing for the word *home*. But do not rename the Home stack just to keep people from seeing it when they open your custom stack. That attitude arrogantly assumes people are not going to use HyperCard for anything except your stack. Why not just open your stack directly—for example, by double-clicking the stack's icon—in the Finder?

If you do create a substitute Home stack, you should base your renamed Home stack on a copy of the standard Home stack. You can change the design of the cards, but don't delete the cards named Stacks, Documents, Applications, and User Preferences.

This tip works in the prerelease version of HyperCard 2.0, except that you have to open STR# resource number 128 (number 1001 doesn't exist) and change the next-to-last (not the first) string in it.—L.P.

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Lon Poole answers readers' questions and selects their tips for this monthly column. He has written many personal-computer books, including the quick reference HyperTalk *(Microsoft Press, 1988), and a new book of Mac tips (to be published soon by Microsoft Press),* Amazing Mac Facts.

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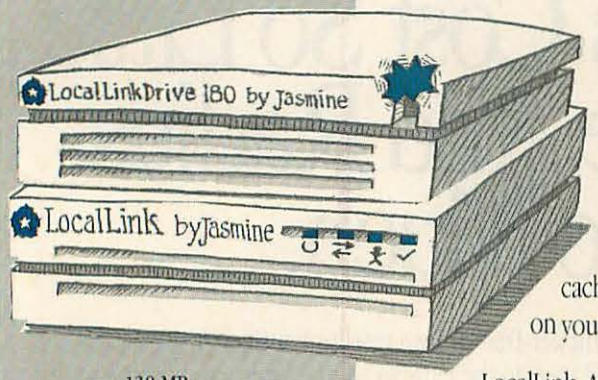

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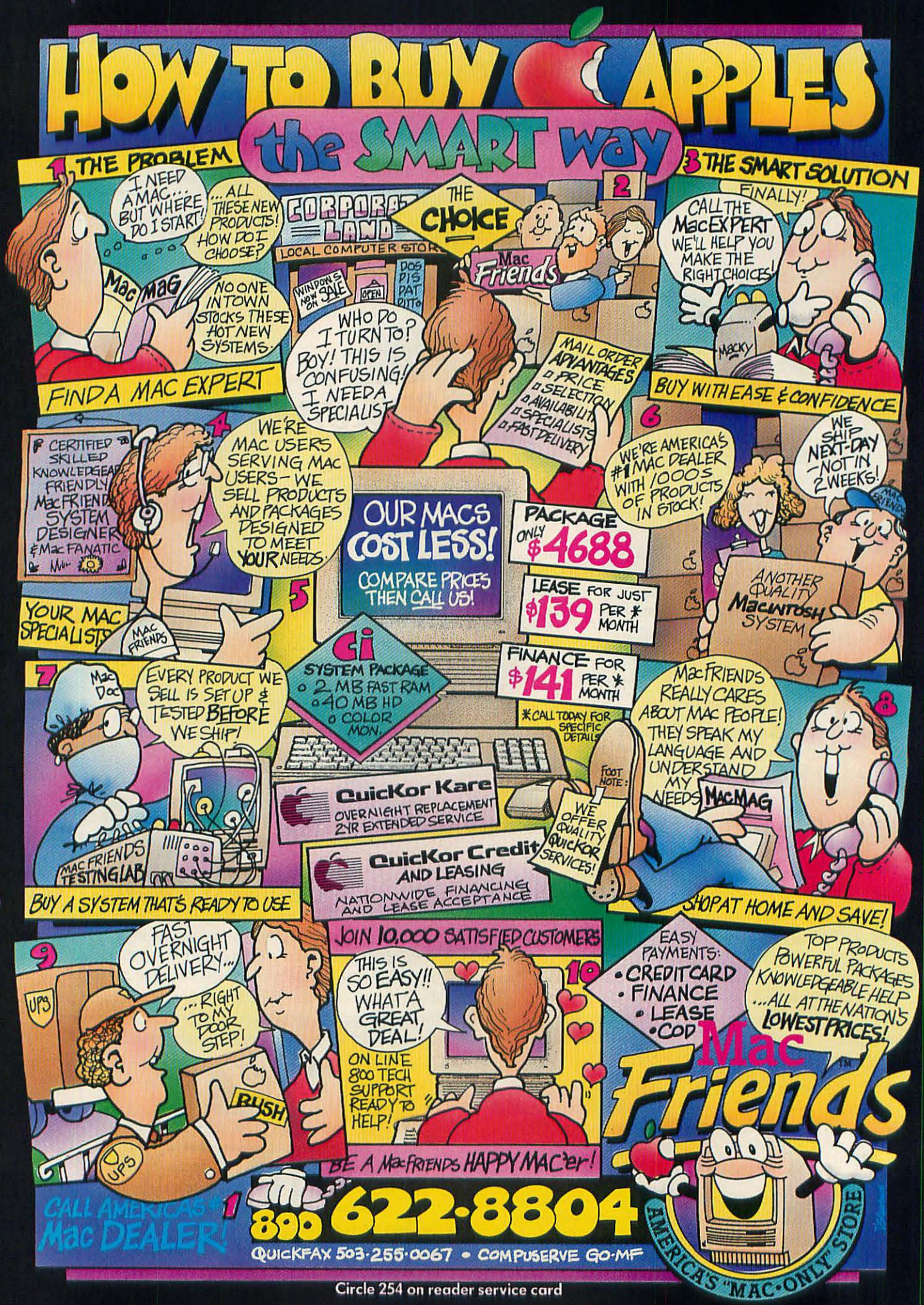

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HOW TO

Getting Started with Input Devices

How to choose the best tools for controlling the Mac

BY JIM HEID

The Mac's *input devices*—its keyboard and mouse—are your links to the Mac, letting you move around the screen in the direction of your choice. And—like most Mac users—you've probably been content to use Apple's stock input devices.

After all, one mouse or keyboard is the same as another, right?

Not quite. These days, Macintosh owners can choose from a large and varied selection of alternative input devices. Some are keyboards and mice that may appeal to people who find Apple's input devices uncomfortable or too expensive. Others fall into the different-strokes-for-different-folks category: *trackballs* don't require as much desktop space as mice, while *graphics tablets* offer penlike control for drawing and drafting applications. And then there's *voice recognition* hardware, which can make the Mac accessible to people with physical disabilities that prevent them from using a keyboard or mouse.

Although many alternative input devices are currently available for the Plus, most are designed for the Mac SE and Mac II families. These newer machines are equipped with the *Apple Desktop Bus (ADB)*, an expansion system designed for input devices (see "The Inbound Bus"). This month, I describe the most popular input devices available for the Mac family and spotlight some products from each class.

Keyboard Considerations

In the Mac world, most alternative input devices are alternatives to the mouse. True, a *pointing device* is the cornerstone of the Mac's graphical interface, but the keyboard is essential too, especially for typing-intensive applications such as word processors, data managers, and spreadsheets.

Apple makes four keyboards for the Mac: the Macintosh Plus keyboard, the Macintosh Portable keyboard, the Apple Keyboard, and the Apple Extended Keyboard II. The Mac Plus and Portable keyboards are included with their respective machines; the Apple Keyboard and Extended Keyboard II use ADB and are sold separately. The Apple Keyboard is similar to the Plus keyboard, with a standard typewriter layout supplemented by four *arrow keys* for moving the Mac's blinking insertion point, and a calculator-like *numeric keypad* for fast number entry. Many word processors also use the numeric keypad for scrolling.

The Apple Extended Keyboard II supplements the standard keyboard's typewriter, arrow, and numeric keypad keys with additional scrolling keys and a row of 12 *function keys*. Many programs, including Microsoft Word 4.0 and WordPerfect, use the function keys as keyboard shortcuts for often-used menu commands. You can also create your own function-key shortcuts using a macro utility such as CE Software's QuicKeys, or Affinity Microsystems' Tempo II (see "Getting Started with Utilities," February 1990).

I recommend an extended keyboard for anyone with enough desk space to accommodate it. Even if you never create any macros, you'll find

(continues)

MARK JASIN

THE INBOUND BUS

The Apple Desktop Bus (ADB), used on all Macs except the Plus, is a simple expansion system designed for input devices. The Mac provides two ADB connectors, as do many ADB input devices. You can attach multiple input devices to a single connector by *daisy-chaining* them—attaching one device to another. Although the ADB can accommodate up to 16 devices, Apple warns against attaching more than 3 to each connector because ADB signals deteriorate as the cable length increases.

The Mac's ADB connectors also provide a source of power, so you don't need a separate power supply or power outlet for each device. The battery-powered Mac Portable, however, requires low-power ADB devices designed to draw less juice.

Before connecting or disconnecting an ADB device, you must first shut off the Mac, or it may fail to recognize one or more of the devices. Another incentive to turn off the Mac is that ADB connectors may short-circuit momentarily when installed or removed, damaging the input device or the Mac itself. Some people who travel with a Mac have also reported problems with the connectors wearing out after repeated use, so it's wise not to attach and detach ADB devices too frequently.

its additional scrolling keys useful for navigating through documents. What's more, the Extended Keyboard II provides adjustable feet that let you tweak the keyboard's angle for comfortable typing and less hand fatigue. Its layout almost matches that of the latest IBM keyboards—useful if you switch between Macs and PCs or use Insignia Solutions' SoftPC software, which lets Macs run IBM PC programs (see "Mac DOSsier," *Macworld*, July 1990).

(Incidentally, the Extended Keyboard II, as its name implies, represents Apple's second attempt at an enhanced keyboard. The original Extended Keyboard provided an identical layout, but lacked the angle-adjustment feet. If you're buying an extended keyboard, be sure to get the latest model. Its Apple part number is M0312; its predecessor's was M0115.)

Apple's ADB keyboards also offer a *power-on key* that turns on a Mac II. On the SE and SE/30, the power-on key has no effect. You can, however, put it to work by using Sophisticated Circuits' PowerKey—which provides three outlets that supply juice when you press the power-on key—or Practical Solutions' Strip Switch which provides one outlet to which you can attach a power strip. Strip Switch also lets you turn off power by tapping the power-on key twice. Practical Solutions also claims to be developing a power-on key for non-ADB Macs.

Competing Keyboards

If you haven't bought a keyboard yet, or if you're thinking of upgrading from a standard to an extended version, consider a non-Apple keyboard. Not only do these products cost less than Apple's Extended Keyboard II, many offer useful features—missing from Apple's models—providing even more value for the money.

One popular alternative keyboard is Datadesk International's Mac-101, available in an ADB and non-ADB version, which includes a macro utility and provides a layout nearly identical to that of the Extended Keyboard II. The primary difference is that the Mac-101 provides just one set of Control, Option, and ⌘ keys, while Apple's keyboard provides two, one on either side of the spacebar.

key tronic Corporation's MacPro provides a layout similar to that of the Extended Keyboard II, but with a larger Return key that supposedly reduces data entry errors. The MacPro, available for ADB Macs only, also includes the Tempo II macro utility.

If you're fond of function keys, you can't beat Northgate Computer Systems' 119-key OmniMac Ultra, which provides user-programmable function keys—12 across the top and 12 along the keyboard's left edge. The OmniMac Ultra also provides a useful comma- and period-lock feature that prevents you from getting angle-bracket symbols (< or >) when you press the comma or period key while holding down the Shift key. OmniMac Ultra includes a scaled-down version of CE Software's QuicKeys, and the keyboard works with the Plus as well as with ADB-equipped Macs.

Possibly the most interesting alternative keyboard is Datadesk International's modular-design Switchboard. It lets you remove the keyboard's numeric keypad, for example, and replace it with a trackball, which I'll describe shortly. You can even get function-key modules that contain their own memory for storing macros and custom keyboard shortcuts.

But there's another, more subjective, reason to consider a non-Apple keyboard: how it feels. The pressure required to generate a keystroke, how well the keys respond to fast typing, the sound they make when pressed and released—these characteristics combine to give every keyboard its own personality. If you find Apple's keyboards uncomfortable or unresponsive, give the competition a try. But remember, you will be stroking those keys for years, so don't buy a keyboard until you've test-driven it.

Pointing Alternatives

Since its invention in 1964, the mouse has become the world's premier pointing device. Apple builds a first-rate rodent that meets most users' needs—and, unlike a keyboard, it's conveniently included with each machine. But tastes in input devices do vary, and certain tasks benefit from a different approach to pointing.

Although Apple's mice are among the best, they're mechanical beasts prone to wear and breakdown. The mouse mechanism uses a rubber ball that requires a smooth surface on which to roll, lest the pointer jerk across the screen. The ball and the rollers it touches accumulate dirt and require periodic cleaning. An extremely dusty environment—a factory, a wood-heated house, or my office—can choke an Apple mouse to death.

A mouse that doesn't share these

shortcomings is Mouse Systems Corporation's aptly named Little Mouse. Designed for ADB-equipped Macs, the Little Mouse is an *optical* mouse—rather than measuring the movement of a rubber ball, it measures the light reflected from a 7-by-8-inch pad covered with a grid of minute dots (see "How Pointing Devices Work"). Aside from its button, the Little Mouse has no moving parts to wear out or get cheesy. It's also smaller and lighter than an Apple mouse. The required mouse pad does add to desktop clutter, but many people prefer to use a mouse pad even with a conventional mouse because the mouse glides nicely on a pad's smooth surface. I used a Little Mouse for a few weeks and found it a worthy alternative to an Apple mouse.

Another contender is Advanced Gravis's $129.95 SuperMouse, for ADB-equipped Macs. It has not one button but three, and lets you program them to issue ⌘-key sequences or execute macros (a scaled-down version of QuicKeys is included). People who use Apple's AU/X version of the UNIX operating system may like the SuperMouse especially well, since UNIX is often used with a three-button mouse.

For those who like the mouse but not its tail, there are Practical Solutions' Cordless Mouse and Basic Needs' The Cordless Mouse. Both use an infrared link instead of a wire. Each requires batteries and provides a sleep mode that conserves juice when the mouse isn't moving.

Pointing without Rolling

But even a tailless mouse requires some desk space in which to roam. If you just can't spare that kind of real estate, consider a *trackball*—a plastic ball that sits on rollers housed within a small case that, like a keyboard, occupies a fixed location on your desk. To move the Mac's pointer, you roll your fingers across the trackball.

Most trackballs provide two buttons. One works just like a standard mouse button, while the other works like a mouse button that sticks. This second button lets you drag icons, windows, or other items without holding down a button: click the button once to start dragging, then click it again to stop. By giving your hand one less chore to perform, a locking-click button can help you make more precise pointer movements, and it eliminates the finger fatigue that hours of delicate dragging can cause.

Some trackballs—such as Kensington Microware's Turbo Mouse ADB—let you combine both buttons to perform special tasks. For example, you can configure it to issue an often-used keyboard command, such as ⌘-S for Save. This technique of pressing two or more buttons simultaneously is called *chording*.

Other ADB-compatible trackballs include Mouse Systems Corporation's three-button Trackball/ADB; Abaton's two-button ProPoint; MicroSpeed's three-button MacTrac; lynx Computer Products' two-button lynx Turbo Trackball and Kraft Systems' two-button Trackball ADB, which can accept an optional foot pedal for clicking. All but Kraft's trackball are also available for the Mac Plus.

Something to consider when track-

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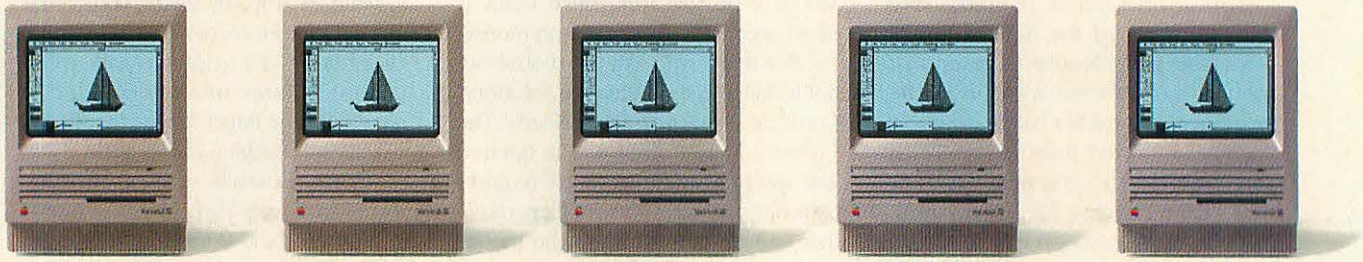

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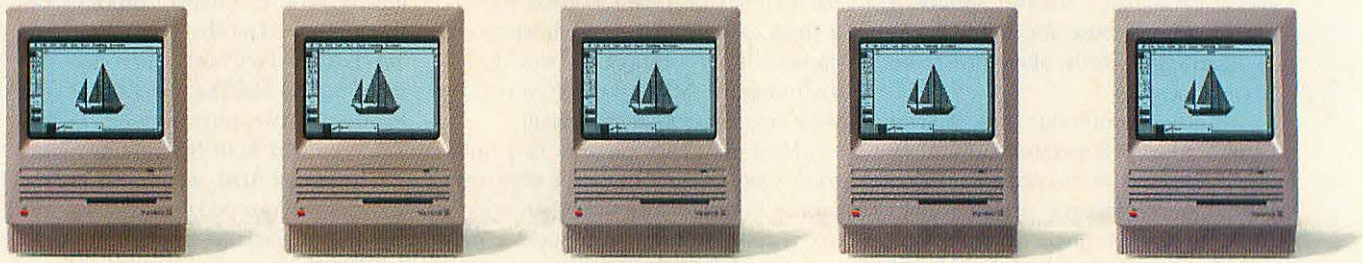

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ball shopping is the size of the ball itself. Some people find that a smaller sphere, such as the lynx Turbo Trackball's, gives more control. See how comfortable you are with the size and position of the trackball's buttons. They're all different: Kensington's Turbo Mouse ADB's big buttons curve around the trackball itself, while Abaton's ProPoint has one large button and one small one to help you remember which is the locking one. And if you're left-handed, opt for a trackball that lets you reverse the functions of the single-click and locking-click buttons.

Absolute Pointing

As effective as mice and trackballs are, they still lack the familiar feel of a pen or pencil, making them second-best tools for drawing and drafting. For these tasks it's hard to beat a *graphics tablet,* also called a *digitizing tablet.* Tablets provide a flat drawing area upon which you scrawl using a penlike *stylus* whose tip contains a switch that mimics a mouse button. Most tablets have a drawing area that's covered with a clear plastic sheet, or *overlay,* under which you can tuck artwork to be traced. A newspaper artist might use a graphics tablet and a drawing program such as Aldus FreeHand or Adobe Illustrator to trace a map or diagram to accompany a story. Many tablet pens accept ink-filled cartridges, allowing you to place a sheet of paper on the tablet's surface to see on paper what you're drawing on screen.

Tablet work areas vary widely in size, and as the size increases, so does the price. One inexpensive tablet, CalComp's Wiz (for ADB-equipped Macs) provides a small work area—7½ inches square. Midrange tablets have work areas of about 8½ by 11 or 11 by 17 inches. Large tablets can give as much work area as a drafting table. Wacom's SD-013L, for example, offers a 35-by-47-inch drawing surface.

But their pen-on-paper operating style isn't all that makes tablets superior drawing tools. Equally important, they're *absolute-motion* pointing devices, while mice and trackballs are *relative-motion* pointing devices. Your blind mouse can't report its physical location—it doesn't know whether it's at the edge of the desk or in the middle. When you pick up the mouse and set it down elsewhere, the pointer doesn't suddenly jump to a different spot on the screen. Mice and trackballs simply report that they're moving a certain distance in a certain direction.

In contrast, each point on a graphics tablet corresponds to a point on the Mac's screen. Pick up a tablet's stylus and then touch it to a different part of the drawing area, and the Mac's pointer *does* suddenly jump to a different part of the screen. It's this operating style that makes tablets ideal for tracing and drawing. Most tablets also provide a relative-motion mode that you can use when you want mouselike operation.

Graphics tablets are also better able to discern small degrees of movement. Mice and trackballs can generally discern 200 to 300 units of movement per inch, but graphics tablets typically detect 1000 units or more per inch. The higher a pointing device's *resolution,* the better suited it is to precise drawing, since it's able to reg-

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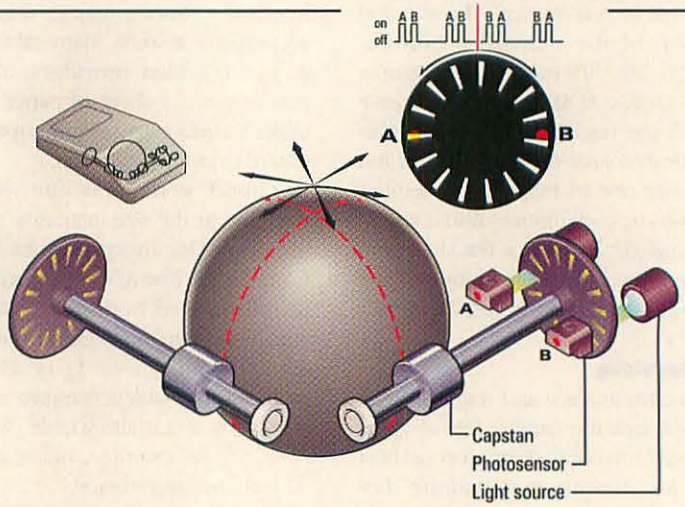
How Pointing Devices Work

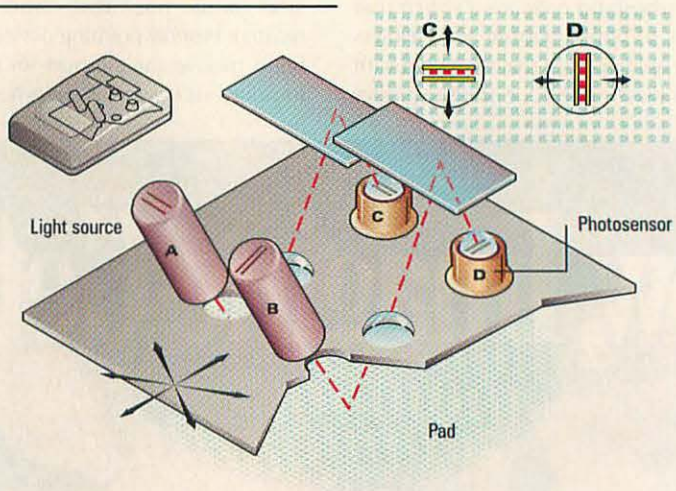
Mechanical Mouse

In an Apple mouse, a rubber ball touches two capstans, which are connected to slotted wheels sandwiched between two light-source-and-photosensor pairs (**A** and **B**). When the ball rolls, the capstans turn the wheels, whose slots interrupt the light. Each interruption is interpreted by the Mac as one increment of movement. The sensors are offset slightly so that, as the wheels turn, they produce a pair of signals with a pause between. The direction a wheel turns is indicated by which sensor, **A** or **B**, produces the first signal in each pair. Trackballs work similarly, except only the ball (not the entire housing) moves.



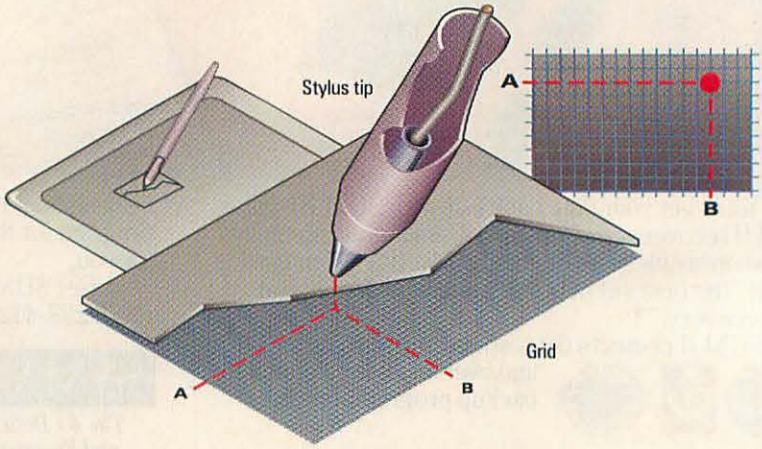
Optical Mouse

In an optical mouse, light from two light sources (**A** and **B**) reflects off a pad covered with a fine grid of dots. The image of the grid is projected onto two separate photosensors. One senses vertical movement **(C)** and the other horizontal movement **(D)**. As the reflection of the grid passes over the sensors, circuitry within the mouse counts the dots to determine the distance the mouse has moved in either direction.



Tablet with Stylus

In a graphics tablet, a drawing stylus or cursor exchanges minute radio signals with the tablet through a grid of wires that crisscross the drawing area. The tablet determines the location of the stylus and transmits the location information to the Macintosh. The stylus doesn't need to touch the tablet surface itself; this means you can trace a drawing, even through several pages of a book.



ister even minute movements.

For artists, the most exciting graphics tablets are pressure sensitive. With tablets such as Wacom's SD series, pressing harder with the stylus gives you a darker or wider line. But there's a catch: you need a graphics program that responds to the pressure information the tablet sends. Wacom tablets include driver files that enable Deneba's UltraPaint and Silicon Beach Software's SuperPaint 2.0 to respond to pressure. Adobe Photoshop supports Wacom tablets directly.

Another desirable, if costly, trait to look for in a tablet is the ability to work with a cordless pen. By eliminating the pen-to-tablet umbilical, tablets such as Wacom's SD series and Kurta's IS series take one more step toward providing a natural-feeling drawing surface. Most tablets, including Wacom's and Kurta's, also accept a mouselike *cursor* containing a lens with crosshairs that aid in precise positioning.

Finally, to help earn their keep, many tablets accept *command templates* that give you one-click access to frequently used commands. A template package includes a disk and a printed sheet that slips beneath the tablet's plastic overlay and contains labeled boxes in which you click to issue commands. Of course, locating the right box and then clicking in it can take as long as choosing the command with the mouse. But it never hurts to have another option for choosing commands, and some people do find templates ideal alternatives.

I Said Cut, not Quit

Keyboards, mice, trackballs, and graphics tablets represent the mainstream of input devices. In the backwaters, you'll find some specialized devices, including *joysticks.* Anyone who's seen a video game has seen a joystick; it's a moving appendage similar to a car stick-shift with a button on top. Advanced Gravis's MouseStick and CH Products' Mach IV Plus also provide buttons alongside the stick. The MouseStick provides several goodies, including adjustable stick tension and programmable buttons that transmit commands when pressed. Both are available for ADB and non-ADB Macs. Joysticks remain best suited to game playing, but they can also be used as mouse replacements.

A distant cousin to the joystick is Altra's $169 Felix, for ADB-equipped Macs. Felix uses a short, stubby stick that moves within a one-inch area. Altra says the stick's tight area of travel makes it feel more precise and natural than a mouse or conventional joystick. Felix was previously marketed by Lightgate Systems, but Altra says it's improved the stick's precision and features considerably.

And then there's *voice-recognition* hardware like Articulate Systems' $795 Voice Navigator II, available for the Plus on up, and MacSema's Voice Express, available for the Mac II family (an SE version is in the works). Both devices let you issue commands by speaking them. But first, you (and anyone else who will use it) must train the system by repeatedly speaking the words you want it to recognize. Thereafter, the system compares what you say to what it knows, looking for matches. Voice-recognition hardware can't yet take dictation and replace the keyboard for general data entry, but it can aid users who have disabilities.

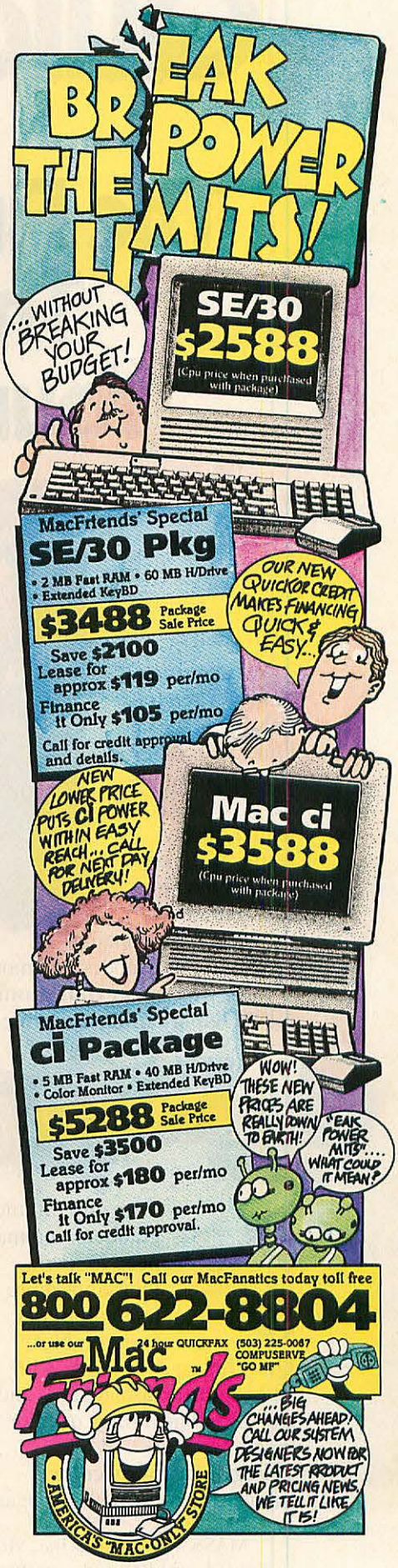
Some people believe voice recognition represents the future. I doubt it. Today's systems are too primitive, unable to tell *two* from *too,* for example, and susceptible to background noise and variations in pronunciation.

Others claim handwriting recognition—already available in a limited form from Personal Writer's Personal Writer 15SL graphics tablet—is where we're heading. I don't think so. These days, more people can type than ever before, and most of them can type faster than they can write.

Until some as-yet-unforeseen breakthrough occurs, keyboards and mice will probably remain the preeminent input devices. Besides, who wants to work in an office full of people barking at their computers? M

See *Where to Buy* for contact information.

Jim Heid is a Macworld *contributing editor who each month focuses on Mac fundamentals. His latest book, coauthored with Peter Norton, is* Inside the Apple Macintosh, *(Brady, 1989). He can be contacted on America Online as JimHeid.*



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Insights on Quicken 1.5

IF YOU THINK IT JUST DOES CHECKS, TRY OUT THESE TIPS FOR MANAGING BUSINESS AND FINANCE

BY CHARLES SEITER

Personal finance, believe it or not, has been the fastest-growing software category for the last two years, and during this time Quicken has been the fastest-growing personal-finance program for the Macintosh. However, *personal* in this context is misleading—almost as many people use Quicken to run small businesses as to manage household checkbooks. In fact, you'll find more tips here on small-business use than on checking. Thanks to Macintosh project manager Bob Schulman of Intuit and Carol Miller of the advertising firm Miller & Associates (Tremont, Illinois) for advice and for reviewing some of the tips.

Disaster Avoidance

Maybe you are the proud owner of a faultless hard disk and have never had to use your Quicken backup files. If you ever do have to use them, you will find it helps to have paid a little attention to the way Quicken organizes its records (remember, these backup files are about *money*, not just letters to Grandma).

When you start an account, Quicken makes a check-register file, an unprinted-check–list file, a recurring-transaction file, and a categories file. That's why you see the file name and (a), (b), and (c) versions on the desktop. If you back up only the file you think you created, Quicken will be missing most of the information you entered when you set up the account. So just do this: keep all your accounts files in the same folder inside the Quicken folder, and back up the whole folder. Some day, you'll be glad you did.

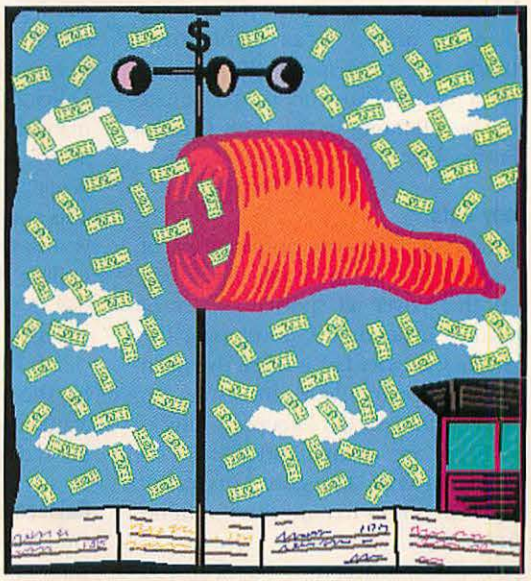
More (and Less) Than Money

Quicken's strength lies in its ability to apply categories to accounts, which effectively makes the program a database for quantitative information. Apparently, many people use Quicken to track airline frequent-flier mileage. You just create an account for each airline you fly, and enter your accumulated miles as if they were dollars. The program doesn't care whether you're really talking about dollars, as long as you have some numerical information. When you want to see where you stand on all accounts at once, create a report from each account, display it on screen, choose Export Report from the File menu, and save the file as text. You can then open all the exported account reports in a word processor and print them out in a suitably compact form.

Quicker Quicken

To keep the screen from getting too cluttered, Quicken opens a rather small window for scrolling the Category List. Enlarging the window for ease in locating categories doesn't help much, since the window stays open and obscures your other work. Intuit put in a neat feature that helps you work efficiently with the small window, but added it too late to make the documentation. Just type the first letter of the category you're looking for and Quicken jumps to that part of the list. This definitely beats watching 200 names roll past in an 8-line window.

Another timesaver: when you're writing checks, you don't have to re-



SCOTT BALDWIN

type the name of the addressee. Just hit the apostrophe (') key and Quicken fills in the name line of the check's address block automatically, using the information you just entered in the Pay To line of the check.

Print Glitches

There are a couple of common cir-

(continues)

cumstances in which a printer gives unsatisfactory results. One annoying condition is this: the printer produces the first check in a series and then skips two blank checks before printing the next one. This doesn't mean you have done anything wrong—it's the response of the program to a slight corruption of the application file itself. Just reinstall the program from the original disk (you're not working with the original, are you?).

Nor have you done anything wrong if you use Quicken's CheckArt HyperCard stack to create a check logo for yourself and then find, when you print checks on a LaserWriter (or for that matter, on a new dot matrix printer that has better than 72-dpi print resolution), that your drawing is jaggier than the edge of a bandsaw. The problem is that CheckArt saves files in 72-dpi MacPaint format. A better move for your financial image is to create the artwork in a program that saves files either in PICT or in object-oriented format.

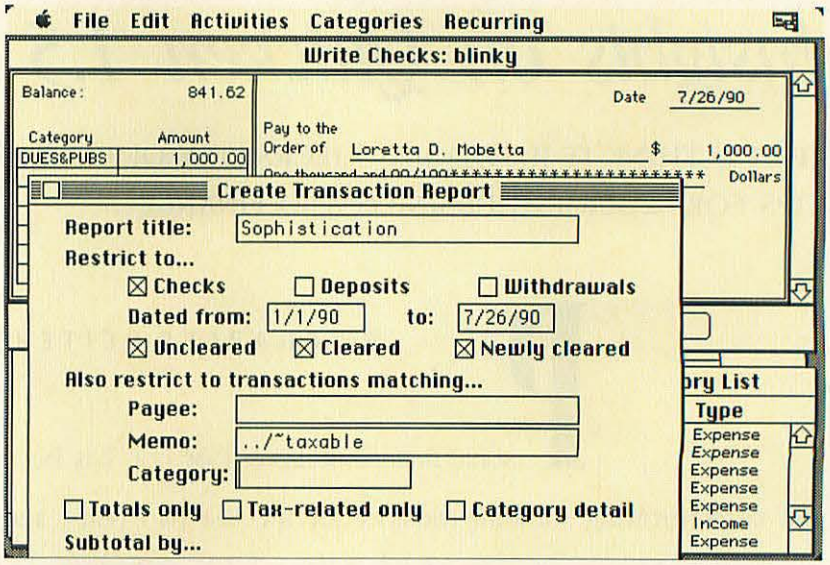
Another printing note: Quicken's usual fast printing mode for checks doesn't work with the popular print-spooling utility SuperSpool. Your choices are to deinstall SuperSpool when using Quicken or to select Graphics Printing in the Print Checks window before printing your checks.

Copy Cats

Since most business applications of Quicken call for specially developed lists that cover all specific classes of business expenditure, developing the custom Category List is often the main bit of intellectual work in setting up Quicken for real bookkeeping. Quicken users are often frustrated in attempts to copy Category Lists properly. Here's how to copy them with no problems.

▪ *For Existing Accounts* Suppose you want to copy the Category List from a business checking account called FirstStore to an existing account called SecondStore. First locate the file called SecondStore (c) in your Quicken folder. To be careful, rename this file SecondStore (c) Original. Now duplicate the file FirstStore (c) and rename the copy SecondStore (c), thus replacing the original. This way when you open the SecondStore account, the categories from the FirstStore list will automatically be available for the second account.

▪ *For New Accounts* Let's suppose you are moving up in the world and are starting a new account called Corporate to replace your old account Partnership. For this circumstance, you use Quicken's own Copy Account command from the File menu, but there's a trick to getting correct performance. When the Copy Account dialog box asks you for the range of dates to copy, you have to set the range so that the ending date is one day past the last day in the original account. You must also uncheck the box for including uncleared transactions. This gives the new file the old file's set of recurring transactions and categories, without any of the old file's transactions.



Instant Sophistication

Quicken provides simple tools you can use for building sophisticated searches. The entry in the Memo field in this report form means "find all transactions that don't have the designation *taxable* (.. means *all*, ~ means *not*.)

Quicken as a Database

Quicken can be formidably useful even without much ingenuity on your part—simply coding everything in your checkbook according to MacInTax categories makes tax time a breeze (note that since tax categories are pretty much defined by tax law rather than programs, this coding still helps even if you do taxes by hand or with another program, such as Heizer Software's tax templates for Excel). Nonetheless, Quicken can easily be adapted to advanced uses; in many cases, users turn to it for fancier types of accounts management after standard databases prove too difficult to program. Here are some pointers.

▪ *Searching* If you plan your categories and the contents of Memo fields carefully, you can perform the equivalent of a multifield search in a flat-file database. When used with Find or Reports, the notation .. acts like a wildcard—it matches anything. For example, entering T.. in the Category field for Transaction Reports gets you a report of all transactions marked with a category beginning with *T;* entering ..$$ finds everything that ends with a $$. The notation ~ means *not* (for example, ~/deductible means *not deductible*) and is useful for picking out transactions from a small number of Memo field types in a set of records (see "Instant Sophistication").

▪ *Coding* Besides wildcards, the key to advanced uses of Quicken lies in imaginative coding of transactions in the Memo field. With wildcards, you can search all parts of the memo independently. By tagging a transaction with the memo "Bob/const/30day/Wilson" you can retrieve it in four types of reports: (1) all the jobs Bob has been assigned by your company, (2) all construction jobs, (3) all jobs that have 30-day-payable status, or (4) all the work done for client Wilson.

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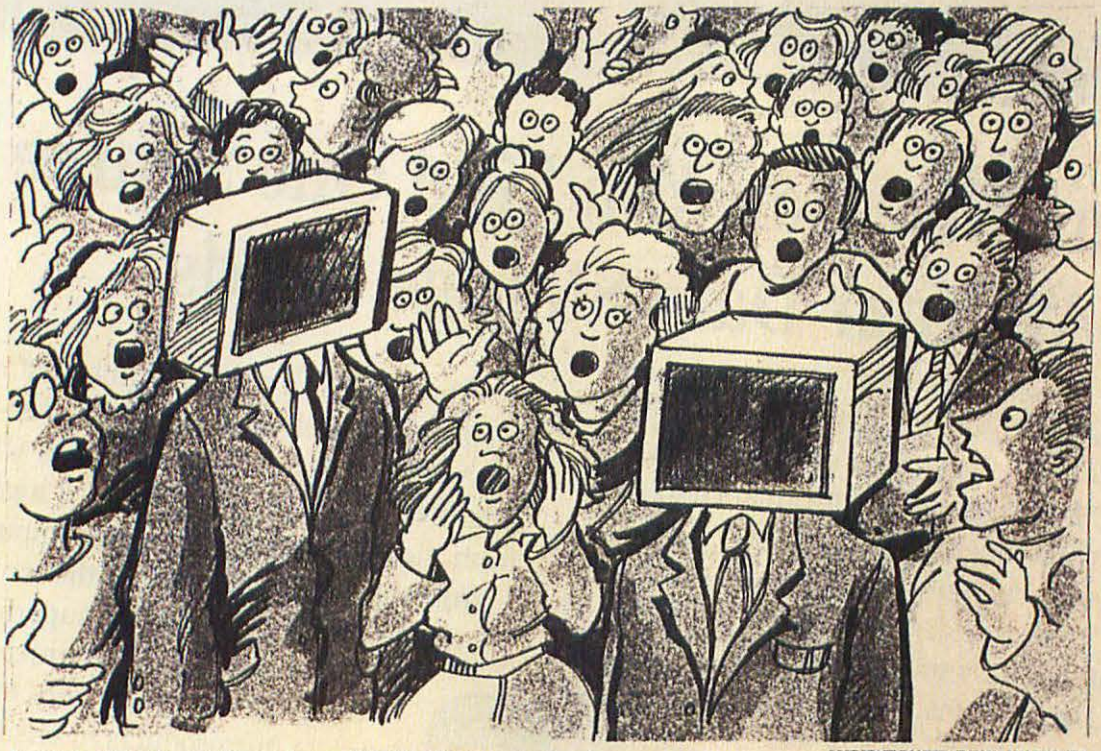

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Hotels roll out the red carpet and lower rates for MACWORLD Expo/San Francisco

Several San Francisco hotels have agreed to offer special discounted rates to all attendees of MACWORLD Expo.

When you call to make a reservation, simply mention that you're going to MACWORLD Expo. There are only a limited number of rooms available at preferred rates, so plan early. **Please note: all area codes are 415.**

HOTEL	PHONE	SGL/DBL
Fairmont Hotel	772-5000	$135/$165
Grand Hyatt	398-1234	$159/$159
Holiday Inn:		
Civic Center	626-6103	$104/$116
Golden Gateway	441-4000	$94/$94
Union Square	398-8900	$109/$129
Hyatt Regency	788-1234	$149/$174
King George Hotel	781-5050	$83/$93
Le Meridien San Fran.	974-6400	$140/$160
Mark Hopkins	392-3434	$165/$185
Nikko	394-1111	$148/$158
Pan Pacific Hotel	771-8600	$165/$180
Parc Fifty-Five	392-8000	$135/$150
San Francisco Hilton	771-1400	$140/$160
San Francisco Marriott	896-1600	$159/$179
Sir Francis Drake	392-7755	$120/$130
Stanford Court	989-3500	$159/$179
Villa Florence	397-7700	$95/$95
Westin St. Francis	397-7000	$120/$135

Register for MACWORLD Expo/San Francisco by December 10th – save $10-$15

This is your chance to preregister for MACWORLD Expo/San Francisco, Thursday through Sunday, January 10-13, 1991, at Moscone Center and Brooks Hall/Civic Auditorium. Due to popular demand, plastic badges are back which may cause long registration lines at the show. To avoid the hassle, preregister and save!

Please choose your package and fill out this form completely. Incomplete forms will be returned. Use one form per person. (Make photocopies to register additional people.) Then send the completed form(s) along with payment to: MACWORLD Expo, P.O. Box 4010, Dedham, MA 02026.

Special Instructions for International Attendees.

If you're preregistering from outside the U.S. and prefer to have your badge sent to you instead of picking it up at Moscone Center, be sure to check the appropriate box on the preregistration form. Also, please add an additional $45 to your preregistration cost. We will Federal Express your badge directly to you. Please fill in the exact street address and be sure to include your telephone number. Do not use a Post Office Box.

MACWORLD EXPOSITION
San Francisco, Jan. 10-13, 1991
MACWORLD Expo/San Francisco
Hotline: 617-361-3941

MACWORLD Expo/San Francisco announces show hours

CONFERENCE & EXHIBITS

Thursday, January 10	3 p.m.- 9 p.m.
Friday, January 11	10 a.m.- 6 p.m.
Saturday, January 12	10 a.m.- 6 p.m.
Sunday, January 13	10 a.m.- 3 p.m.

REGISTRATION

Mon.-Wed, Jan. 7, 8, 9	10 a.m.- 5 p.m.
Thursday, January 10	10 a.m.- 9 p.m.
Friday, January 11	8 a.m.- 6 p.m.
Saturday, January 12	8 a.m.- 6 p.m.
Sunday, January 13	8 a.m.- 3 p.m.

Letters

Land big savings on American Airlines A

MACWORLD PRESS

ERICAN Airlines is the official of MACWORLD Expo. And yo 5% to 45% if you fly to San on American. To take advan- his offer, just call 800-433-1790 for Star File number S-0111AL. automatically receive your unt.

Register for MACWORLD Expo/San Francisco by December 10th and save $10-$15

This is your chance to preregister for MACWORLD Expo/San Francisco, Thursday, Friday, Saturday and Sunday, January 10, 11, 12, and 13, 1991, at Moscone Center and Brooks Hall/Civic Auditorium.

Please choose your package and fill out this form completely. Incomplete forms will be returned. Use one form per person. (Make photocopies to register additional people.) Then send the completed form(s), along with payment to: MACWORLD Expo, P.O. Box 4010, Dedham, MA 02026. **Please do not staple check to form.**

Registration cards must be received by December 10. Cards received after December 10 will be returned. Purchase orders cannot be accepted. Registration fees are non-refundable. For further information call the MACWORLD Expo/San Francisco Hotline at 617-361-3941. U.S. attendees should receive their badges no later than December 28. (Be sure to check box indicating where badge should be sent.) All other badges will be held at the Non-U.S. Preregistration Counter at Moscone Center for pick up beginning Thursday, January 10.

MACWORLD Expo Attendee Bonus:

All registration fees to MACWORLD Expo/San Francisco include a six month, $7.50 paid subscription to *MACWORLD Magazine*. (*MACWORLD*'s basic subscription rate is $30.00 for 12 issues.) When you preregister, we'll include your *MACWORLD Magazine* subscription request form in the preregistration package.

Please register me for:

☐ **Package One $65**
Conference sessions* and exhibits
Preregister by December 10.
($80 cash only at the door)

☐ **Package Two $15**
Admission to exhibits only.
Preregister by December 10.
($25 cash only at the door)

☐ I am an International attendee and would like my badge shipped by Federal Express. I have enclosed an additional $45.00.

Please send my badge and further information to:

Please check one: ☐ **Home Address** ☐ **Company Address**

Last Name _____ First Name _____

Street Address _____

City, State, Zip _____

Country _____

Telephone _____

If mailing to company address:

Title _____

Company _____

☐ Check enclosed (make payable to MACWORLD Exposition) Amount: $ _____

☐ Master Card ☐ Visa ☐ American Express Amount: $ _____

Account Number _____ Expiration Date _____
(Include all numbers)

Card holder signature _____
(Signature necessary to be valid.)

If card holder is other than registrant, please print name below:

Last Name _____ First Name _____

Cash only at the door. After December 10, you must register at the show.

Please check the appropriate boxes:

Your industry or profession
01 ☐ Manufacturer (non-computer)
02 ☐ Manufacturer (computer industry)
03 ☐ Distributor/dealer/retailer/service
04 ☐ Finance/insurance/real estate
05 ☐ Business services
06 ☐ Professional (law/medicine)
07 ☐ Health services
08 ☐ Communications/publishing
09 ☐ Education
10 ☐ Government
11 ☐ Consultant
12 ☐ Other (specify) _____

Your title
13 ☐ CEO/president/vice president
14 ☐ Comptroller/treasurer/accountant
15 ☐ DP/MIS manager
16 ☐ Owner/partner
17 ☐ Engineer
18 ☐ Doctor/lawyer/dentist
19 ☐ Educator
20 ☐ Art director/writer/editor
21 ☐ Consultant
22 ☐ Marketing
23 ☐ Sales
24 ☐ Other (specify) _____

Which personal computer(s) do you own/or use?
25 ☐ Macintosh
26 ☐ Macintosh Plus
27 ☐ Macintosh SE
28 ☐ Macintosh II
29 ☐ Apple II Series
30 ☐ IBM PC (or compatible)
31 ☐ None
32 ☐ Other (specify) _____

*All conference sessions are on a first-come, first-served basis with no guaranteed seating. ALL REGISTRATION FEES ARE NON-REFUNDABLE. Please fill out this form completely and send it, along with your check or money order to: MACWORLD Expo, P.O. Box 4010, Dedham, MA 02026. **PLEASE DO NOT STAPLE CHECK TO FORM.**

MACWORLD EXPOSITION®
San Francisco, January 10-13, 1991

Mac

EXTRA! EXTRA! MACWORLD Expo comes to San Francisco, January 10-13.

In four action-packed days, you'll pick up all the latest Macintosh news — and discover new ways to put your Mac to work — in the office, in the lab, in the studio, in the classroom, or in your home.

With over 500 exhibiting companies, there's something for everyone.

Whether you're interested in networking, spreadsheet analysis, databases, multimedia, education, accounting, law, engineering, forecasting, design, publishing, illustration, animation, music, programming, or fun and games, you'll find it at MACWORLD Expo/ San Francisco.

The Mac keeps getting more and more exciting, with an ever-increasing array of applications! So we've expanded the conference program to reflect the exciting new areas where Mac is making inroads, and to keep you up-to-date on topics you always request.

Here's a quick look at what you can expect in San Francisco next January:

State-of-the-Art Show-Starters — spend Thursday attending your choice of 12 dazzling State-of-the-Art Sessions, each designed to provide you with an authoritative overview of the latest and greatest developments in each conference track (and a few surprise areas) — plus give you a taste of what the future might hold.

Keynote Sessions — begin Friday and Saturday with a fever-pitch of excitement at the MACWORLD Expo Keynote Sessions, featuring luminaries from the world of Macintosh, insights from industry leaders, and a classic example of just how much fun the Mac can be!

Nine Conference Tracks — following the Keynote Sessions you can choose from sessions in nine different topic areas. You'll hear: tips and tricks from users; developing trends from industry insiders; what's new and exciting in dozens of application areas; how to avoid pitfalls into which the unwary have stumbled; reviews on the latest software and hardware products; plus powerhouse pointers, time-saving ideas, terrific insider's tips, and much, much more!

Application Workshops — beef up your Mac knowledge on Sunday with a series of two-hour intensive learning sessions to provide guidelines, tips, and how-to's on the most popular uses of the Macintosh. Here's more about the Nine Conference Tracks:

1. The Multimedia Mac — sessions to dazzle and demonstrate the fabulously exciting integration of video, sound, and animation by the Macintosh — and how multimedia can benefit you.

2. Designer Solutions — sessions for architects, graphic artists, engineers, advertising agencies, and more, to maximize the usefulness of the Macintosh in design and conquer new worlds in color.

3. The Mac in Entertainment — one of the most exciting new application areas for the Mac, featuring sessions ranging from Desktop Video to the Mac in Hollywood.

4. User Workshops — introductory, for those just getting started with the Mac, or who need a quick, concentrated lesson on the most popular Mac applications; Advanced, where experienced users share their expertise to reveal hot new ideas and insider's tricks; and Software Review Sessions, for authoritative, unbiased overviews of the best-selling Macintosh software packages.

5. The Mac in Big Business — solid advice and case studies to help solve the unique problems of users in large organizations, along with discussions of the possible impact of developing trends and technologies in the Mac marketplace.

6. Programmer/Developer Forums — where veteran and novice techies gather to brainstorm, learn about innovative advances and techniques, and more.

7. Special Interest Group Meetings — sessions to serve the needs of users in a broad range of settings who are continually seeking new ways to prosper and profit from the Mac. Includes: Education Workshops — a golden opportunity for teachers and administrators from kindergarten through graduate school to learn how their colleagues across the country are using the Mac to great advantage; Home Office/Small Business Survival Guide — resources, recommendations, and how-to's especially useful to the Macintosh home office worker; plus sessions to highlight The Mac in Health Care and The Mac in the Law Office.

8. The Lighter Side — as well as being a business/education tool without equal, the Mac was designed to be fun! This track features sessions to keep a smile on your face and on your Macintosh's screen.

9. Late-Breaking/Popular Demand Topics — to keep our conference program (and you!) up-to-the-minute, we'll top off the agenda with sessions to reflect both special requests and the newest market developments. Included here will be the ever-popular MACWORLD Expo User Group Extravaganza (MUSE), the indisputably reliable source for users to share information, compare tips and strategies, discuss their concerns and problems, and get hard-hitting answers to questions.

Special rates on hotels and airfare.

Show attendees can also save on airfare and hotels. Save from 5% to 45% by flying to San Francisco on American. To make your airline reservations, simply call 800-433-1790 and ask for Star File S-0111AL. You'll automatically receive your discount.

And be sure to book your accommodations directly with the participating hotels listed on the front side of the registration card bound into this ad.

Register by December 10 and Save $10 - $15!

Save $15 on a full registration, including all Conference Sessions and Exhibits, by registering before December 10. ($65 in advance, $80 at the door.) Or preregister for Exhibits only and save $10. ($15 in advance, $25 at the door.)

Preregistration not only saves you money, but time as well. We'll send you your plastic admission badge early so you can walk right into MACWORLD Expo! The plastic badge registration system will be used on site and may cause registration lines at the show to be very long. So avoid the long line hassle, preregister and save.

To preregister for MACWORLD Expo/San Francisco, simply complete the attached form and send it in with your payment (by check or credit card.) For more information call the MACWORLD Expo Hotline at **617-361-3941.**

MACWORLD EXPOSITION

*All conference sessions are on a first-come, first-served basis with no guaranteed seating.

MACWORLD Expo is sponsored by *MACWORLD, the Macintosh™ Magazine*, an IDG Communications publication. MACWORLD Exposition is an independent trade show produced by World Expo Corp., and managed by Mitch Hall Associates and not affiliated with Apple Computer, Inc. MAC and MACINTOSH are trademarks of Apple Computer, Inc. World Expo is an IDG company, the worlds leader in information services on information technology.

MAIL-ORDER CONSUMERS DO HAVE RIGHTS.

The vendors and developers who advertise in the pages of **Macworld** share with us a common goal—to serve you, the consumer. And as a mail-order consumer, you have certain rights you should know and understand.

Mail-order sales must comply with the rules of the Federal Trade Commission (FTC) and various state laws. Here are some guidelines to alert you to your rights and help you shop by mail more effectively.

THE FTC MAIL ORDER RULES STATE:

1. The Seller must ship your order within 30 days of receiving it, unless clearly stated otherwise in the advertisement.
2. If the Seller cannot ship your order when promised, you must be notified in writing prior to the promised date. The notice must specify a new date if available, and must give you the opportunity to (a) cancel with a refund; (b) agree to a specified delayed shipping date; or (c) agree to an indefinite delay.
3. The Seller's notice must include a postage-paid reply envelope or card so that you may indicate your preference. If you do not respond, the Seller may assume you agree to the delay.
4. Even if you agree to an indefinite delay, you retain the right to cancel at any time before the merchandise has been shipped.
5. If you cancel an order that has been paid by check or money order, the Seller is obligated to mail your refund within seven business days. If you paid by credit card, the Seller must credit your account within one billing cycle following receipt of your cancellation. Store credits or vouchers are not acceptable in place of a refund.
6. If the item you order is unavailable, the Seller may not send you substitute merchandise without your consent.

DO'S AND DON'TS

By mail:

- Compare prices, including sales tax and shipping fees, before you order. Your purchase may be exempt from sales tax—check your state laws on collection regulations. Handling, packing, and shipping fees are legal and most states tax these services.
- State the precise specifications of the merchandise, such as model, make, size, component parts, etc.
- Confirm the price and expected delivery date as advertised.
- State on your order whether you will accept substitute merchandise if the item you specified is unavailable. If you won't accept a substitute, state that your payment should be returned.
- Record of payment is essential if a problem arises, so do not send cash.
- Keep copies of your order and all associated correspondence. Your records should include the company's name, address, and phone number; a description of the merchandise; your canceled check or money-order carbon; the date you mailed the order; and any sales slips and shipping receipts.
- Do not insure your order. It is the Seller's responsibility to make sure you receive your merchandise.

By phone:

- Note the name of the person who takes your order, and the time and date of your conversation.
- Make a record of your order, the price, promised availability, and the expected components.
- Save all correspondence, including your canceled check or money-order carbon and any written confirmation sent by the Seller.

Questions to ask:

- Does the advertised merchandise include all necessary parts and accessories? Are they made by the same manufacturer? Is the version number or model number the same? Is the product compatible with the hardware/software you intend to use it with?
- Can your order be shipped immediately? If not, when will it be available for shipping?
- Has the advertised price increased?
- What warranties does the merchandise carry? Who provides the service?
- What is the Seller's return policy? Exchange or repair? The refund policy?
- If a problem arises, with whom should you correspond?

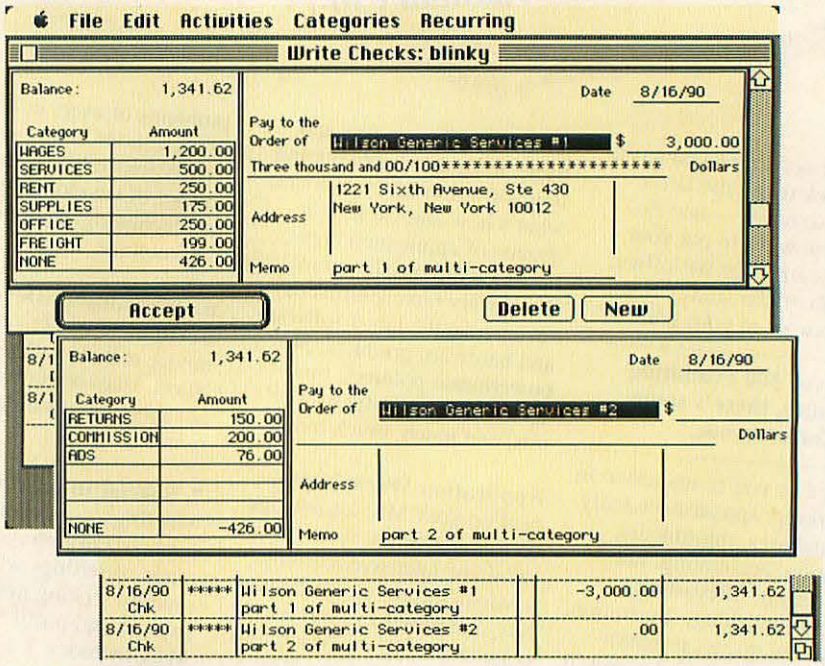
PROBLEMS? SOLUTIONS:

1. If you do not receive your order as promised or if the merchandise is defective, write to the Seller immediately. Include a description of your order, the price, date, and account number or order number if available. Keep a copy of your letter.
2. If you register your complaint by phone, send a follow-up letter to confirm and keep a copy of it.
3. If you think the merchandise is defective, review your product instructions and warranty carefully. Make sure you expect only those features and abilities that the product is supposed to have. Then contact the Seller for procedures. Do not return the merchandise until you have been instructed to do so.
4. If you return the merchandise, keep the shipper's receipt or packing slip. Your right to reimbursement of postal costs is determined by store policy.
5. If you have discussed your problem thoroughly with the Seller and remain dissatisfied, write to the consumer complaint agency in the Seller's state. If you paid for the merchandise by credit card, you may have the right to withhold payment under the Federal Trade Commission's Fair Credit Billing Act.

Macworld believes that the customer has a right to product and service satisfaction. If you continue to experience problems with mail-order purchasing, the President of Macworld Communications and the Editor-in-Chief of Macworld want to know about it. Please take a moment to write to: Jim Martin, President, Macworld Communications, or Letters to the Editor, Macworld, 501 Second Street, San Francisco, CA 94107. You may also phone the President at 415-243-0505 to discuss your situation. Our goal is to help you become a satisfied mail-order consumer.

MACWORLD

The Macintosh® Magazine



Fairly Categorized

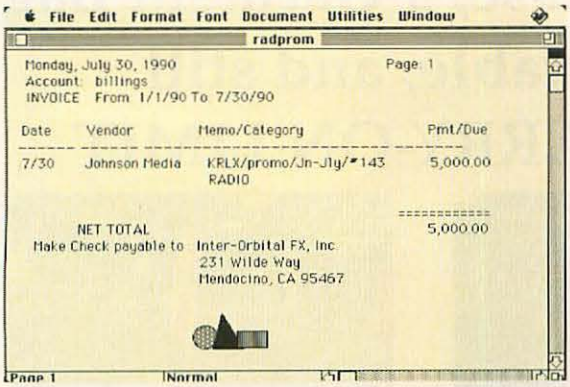
If you need to break up the amounts in transaction into more than seven categories, fill in the first six as you normally would, and then create a new transaction for zero dollars. In this new transaction just fill in categories and amounts until you have used up the balance shown in the category labeled NONE in the first transaction. (Make sure you give both transaction names that are nearly the same so that Quicken will find them when you make reports.) The bottom of the figure shows what the check register looked like.

▪ *Extending Categories* The standard entry form for checks provides only seven spaces for categories. This isn't enough for some business purposes—tracking accounts receivable, for example. Here's how to add additional categories to a transaction for record-keeping purposes (see "Fairly Categorized"). Fill in the first six categories as you would normally. Then make a new transaction with a zero amount and enter up to six more categories. The remainder amount (shown as NONE) automatically offsets the amounts you enter. You can enter as many zero-amount transactions as you need to characterize the actual income or expense.

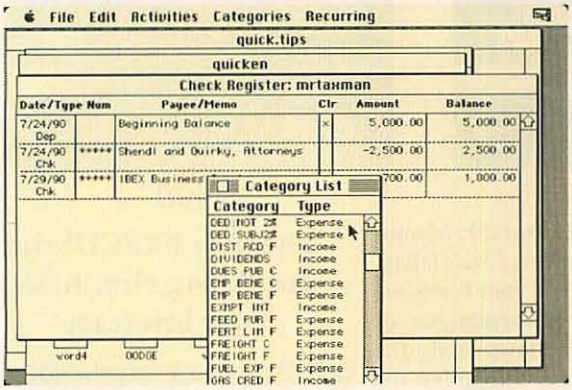
▪ *Invoicing* The advertising firm of Miller & Associates uses Quicken for all aspects of agency accounting, including invoicing. Advertising agency billing is a bit unusual: the agency is supposed to collect payment from clients for media time, and then pay the media (a radio or TV station, for example) and keep a commission out of the client payment. This means that an agency has large amounts of money sloshing through its accounts, of which only a fraction represents actual income for the agency.

Using Quicken to resolve this complex situation lies in (1) junking the standard categories (go to Category List and start deleting), and (2) defining specific categories for types of expenditures (artwork, printing) and income (billings, net commissions). The categories, combined with a standard four-element memo (client code/job/billing code/invoice number) lets the agency do two important jobs. First, in billing, it can tag income items received to indicate real net income to the agency before media bills are paid (each income item has an associated Memo field item allowing net to be computed). Next, the detailed memo feature lets the agency prepare invoices for clients within Quicken. These are just transaction reports with *Invoice* as the title, and with the invoice number as the search criterion in the Memo field (../INV#).

Because all aspects of the transaction are coded either by category or by memo, it's possible for the agency to review all activity involving a particular client for a range of dates, for example, or to find uncleared transactions past 60 days. For invoicing pur-



Revenue Enhancement
Quicken lets you export transaction reports to standard word processors, so you can use the reports to generate standard invoices or other billing instruments. In this figure a report has been combined with some standard company information (at bottom) and edited in the word processor so that the printout will fit on a single page.



The Sub Way
The entries near the top of the Category List hint at one of Quicken's strengths—use of subcategories. When you generate a report, the entries corresponding to the subcategories of a particular category are subtotaled. Quicken users often define a nonchecking category and use subcategories to track cash and credit card activity.

poses, Miller & Associates prints its invoice reports on a LaserWriter using paper stock that's preprinted at the bottom with the agency's name, address, and logo. Alternatively, Quicken users can paste this kind of report into a custom form in Microsoft Word or another word processing program (see "Revenue Enhancement").

The Categorical Imperative

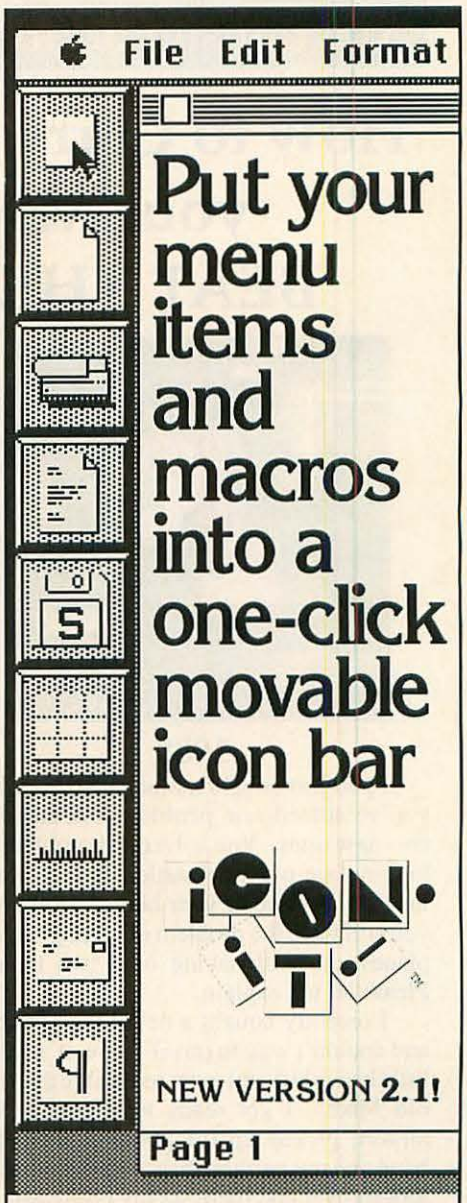
In Quicken, the format CAT1:SUBCAT2 defines a subcategory within a category. "The Sub Way" shows one of the few places you will see an example of this particular Quicken capability. Look at the colons in the first two categories (next to the cursor). The significance of this arrangement in the Category List is that subcategories are, appropriately enough, subtotaled in Quicken reports. For example, you might create a category for all noncheck expenses (NC) and then create subcategories for transactions made without checks (NC:CASH, NC: AMEX, NC:MCHRG, and NC:VISA). This setup would enable you to run a single subtotal for noncheck funds, but still get separate reports for cash and various types of credit transactions. For tax purposes you'd enter a transaction every time you made a credit card purchase, recording a withdrawal with the Amount line left blank. Fill in the real category (legal, services, entertainment) on the first category line, with an amount. The transaction window shows a debit to the dummy credit card account category. When the credit card bill arrives, if you have kept track of everything properly, you simply write a check to the credit card firm for the accumulated debit amount in that credit card category. In the meantime you are generating credit card records that can be readily sorted for tax purposes, and you also have a way of producing reports to yourself on noncheck expenditures.

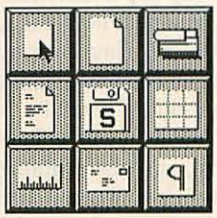
Sharing the Wealth

If you've found a tip or shortcut not mentioned here, spread the word to other *Macworld* readers by sending it to *Quick Tips, Macworld,* 501 Second St., San Francisco, CA 94107. ■

See *Where to Buy* for contact information.

Charles Seiter is a Macworld *contributing editor who's written several books on personal finance.*





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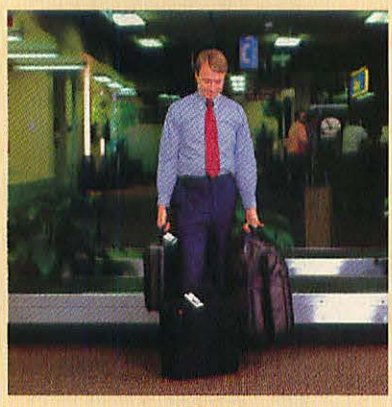
Macintosh Portable Owners!

How to Carry your Briefcase, a Garment Bag, your Macintosh Portable, and still BEAT THE 2 ITEM CARRY-ON LIMIT

1988



1989

1990

If you just bought a Macintosh Portable you've **solved one problem** and **created two new ones**. You solved the problem of lugging the old workstation-style Macintosh from office to your home. However, you still have the problem of getting on airplanes and still having only two hands. Please let me explain.

I recently bought a new Mac portable and couldn't wait to travel. Sure, it's still a little heavy but a lot more moveable than the old Macs. I got ready to leave for the airport, picked up the portable with one hand and my garment bag with the other. I looked over and there sat my briefcase. In the briefcase I had my day planner, cassette player, phone, magazines, note pads, pencils, and business files. There was no way that I could leave my briefcase home yet I seemed to have run out of hands!

The solution was to put my briefcase under my right arm, grab the portable with my right hand and pick up the suit case with my left. Not comfortable, convenient, or easy to do, but I at least made it to the airport.

At the gate I ran into problem number two. Even though I had found a way to carry all three cases they wouldn't let me bring more than two carry-on's onto the plane. All I could do was send the garment bag off with a baggage man and hope that it didn't end up in garment bag heaven. As I got off the plane I carried my Mac and my briefcase to the baggage claim area only to find good news and bad news. The good news was that my bag had arrived, the bad news was that it had been run over by a truck.

Happily I want to announce a solution to this problem. If you own a Portable Macintosh you need the EXECUbrief Saddlebag. The Saddlebag carries all of your briefcase items in slim, lightweight, leatherette or nylon, executive style. It conveniently fits over the Mac portable case combining the two cases into one attractive carry-on.

The EXECUbrief was specially designed for MacAcademy, the nation's leading Macintosh training organization. MacAcademy trainers travel to hundreds of cities, and need the very best in convenient luggage. Now a traveler can carry a garment bag in one hand and the Macintosh and a briefcase in the other.

The EXECUbrief is designed to fit in airline storage compartments or fit under your airline seat. The EXECUbrief has storage compartments specifically designed to carry the new small inkjet printers, computer disks, and all of your briefcase items. The EXECUbrief can even hold a change of clothing. (Even if you don't travel, the EXECUbrief eliminates the need for a briefcase.)

The unique EXECUbrief is designed to withstand the rigors of travel and carries a full year, satisfaction or money back guarantee. Here is a Macintosh product designed by Macintosh travelers. The quality is excellent, the benefits immediate.

To Order.

EXECUbrief is only $149.

To order call (904) 677-1918 with credit card information or write: EXECUbrief 477 S. Nova Rd. Ormond Beach, FL 32174. Orders may also be sent by FAX to (904) 677-6717. Please add $5.00 shipping and handling per case.

The new EXECUbrief saddlebag eliminates your briefcase.

Now, in one bag, carry computer, printer, disks, and all items needed to be completely portable.

The new EXECUbrief easily carries all items normally found in an executive briefcase.

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UPDATES

Here's our list of the current shipping versions of Mac software at the time we went to press. We hope you'll find it useful—because these days, keeping track of the latest CPU is tough enough.

After Dark version 2.0 contains more than 30 different displays, some with sounds such as thunder, screen-munching worms, ticking clocks, and exploding stars. Also contains two new control modules: one that runs several displays simultaneously on the screen, side by side or mixed together, and one that changes displays at user-defined intervals. Berkeley Systems, 415/540-5535. Contact vendor for update price; $39.95 new.

Aldus PageMaker version 4.0 supports the font enhancements in Apple System 6.0 and increases support for several MacDraw II capabilities, including rotated text and graphics, dashed lines, and additional line widths. TIFF files are no longer misnamed when transferred from the PC to the Mac. The program also always performs full screen redraws after print job cancellations, and correctly copies style information for text passed between publications via the Clipboard. Aldus, 206/622-5500. Contact vendor for update policy; $595 new.

TypeStyler version 1.5 increases typographic quality of display type; allows you to specify point size for a text object; has Precision Rotation feature, which allows you to specify the number of degrees to rotate a text object. Font converter can now extract all styles from family-built fonts. Brøderbund Software, 415/492-3200. Contact vendor for update policy; $199.95 new.

PRODUCT UPDATES

Product	V.	Req.	Rev.	Price
1st Aid Kit ★	2.8	512KE/3.0		*
4th Dimension	2.0.1	1MB/6.02	3/90	*
Aatrix CheckWriter II ★	2.01	512K/4.1		$10
Aatrix TimeCard	2.0	512K/4.2		Free
Accountant Inc., Pro	1.03	1MB/6.03	9/90	$19.95
ACCPAC Bedford Simply Accounting	1.1	1MB/5.1		$50
AccuText ★	1.1	4MB/6.02	2/90	*
Adobe Type Manager	1.2	1MB/6.02	2/90	Free
AdWriter	2.0	1MB/6.0		Free
After Dark	2.0	512KE/4.1	7/90	*
Alchemy	1.1	1MB/6.0	10/90	$25
Aldus FreeHand	2.02	1MB/6.03		*
Aldus PageMaker ★	4.0	1MB/4.1	9/90	*
Aldus Persuasion	2.0	1MB/6.0		*
AmPack Plus ★	4.2.2	512K/3.2	1/90	$29.95
Analog Connection WorkBench	3.0	1MB/5.0	5/90	$50
Anatool ★	3.1	512K/3.0		$35
AntiToxin	1.3	1MB/6.0.2	1/90	$15
APL.68000	7.0	512K/3.2		*
Aperture	1.7	2MB/6.0.3	7/90	*
AppleShare File Server	2.0	512K/3.2		*
Archie	2.0	1MB/6.0		$75
ArchiText	2.0	1MB/6.02		Free
Aristotle's Politics	2.0	2MB/6.03		Free
The Art Importer	2.0	1MB/6.0	5/90	$20
ArtRoom	3.0	512K/3.2		$199
AutoCalc	2.0	1MB/6.0		$95
AutoSave II	1.1	512KE/4.2	7/90	$7.50
A/UX	2.0	4MB/6.0.5		*
Aztec C	3.6	512KE/4.2		*
BackFax ★	1.02	1MB/6.03	1/90	Free
Backmatic	1.1	1MB/4.2		Free
Back to Basics: Professional	2.0	512K/3.2		$75
Ball & Stick ★	2.2	1MB/6.0		Free
Bill-It	2.0	1MB/6.03		$29
Bridge	6.0	512K/3.2		$17
Business FileVision ★	1.5	1MB/6.02		*
Business Sense ★	1.2	1MB/6.0		*
Business Session ★	3.2	512K/3.2		Free
CA-Cricket Presents	2.0.1	1MB/6.0		*
Calculator	2.06	512K/3.2	4/90	$25
Construction Set ★				
CanOpener	1.1	512K/3.0		Free
Canvas	2.1	1MB/6.0		*
Capture	3.0	1MB/6.0	2/90	$15
Central System Manager	2.1	1MB/5.0x		*
Chameleon	3.0	512K/3.2		Free
ChromaScan	1.1	4MB/6.02		Free
Claris CAD	**2.0**	**2MB/6.0**		**$79**
Client/Mac	2.0	1MB/6.0		$370
Codecheck	2.0	1MB/6.0		Free
Colleague 2	2.1	2MB/6.03		Free
Colorset ★	1.5	1MB/6.0	6/90	Free
Comment	2.02	1MB/6.0		*
Commtact	2.0	1MB/6.0		Free
CommUnity Mac ★	1.3.1	1MB/6.0		*
CompileIt	1.5	1MB/6.02	3/90	$30
CompuServe Navigator ★	2.1	512K/3.2		*
Computerized Classic Accounting	2.2	1MB/6.0		*
ConcertWare	5.1	512KE/4.2		$35
Control II	1.1	2MB/6.04		Free
CopyFlow	2.0	2MB/6.0	6/90	Free
Cue	3.0	1MB/6.03		*
Data Desk	3.0	512K/4.02	6/90	$125
DataMerge	2.0	512K/3.2		Free
dBase Mac ★	1.01	1MB/4.1		Free
Deluxe Music Construction Set	2.5	512K/6.02		*
D.E.S.	4.0	1MB/6.0		*
Design Dimensions ★	2.15	5MB/6.03		Free
DeskPaint ★	3.0	1MB/4.2	5/90	Free
Developer Stack	2.0	1MB/6.0		$15
DiagramMaker ★	1.1	1MB/6.02		*
Digital Darkroom	1.1	1MB/6.02		Free
DiskDoubler	2.0	1MB/6.02		*
DiskExpress II	2.04	1MB/6.0	11/90	*
DiskFit	1.5	512K/4.1	12/89	$30
DiskTop	4.0	1MB/6.0		*
Display AdBuilder	1.1	1MB/6.03		*
DocuComp	**1.5**	**512K/3.0**		**$19.95**
Dollars and Sense	4.1	512KE/3.2		*
DragonWave	1.1	1MB/6.03		*
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DynaPerspective	2.0	2MB/6.04		Free
DynoDex ★	1.21	1MB/6.0	6/90	Free
Easy Color Paint	1.1	1MB/6.0	9/90	*
Empower II ★	3.03	1MB/4.2		Free
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Fastback II	2.1	512KE/4.1	12/89	$30
Fast Forms	2.0	512K/3.2	11/90	$25
FastLabel	2.0	1MB/6.0		$36
FastTrack	1.5	512KE/5.5		$20
FaxGate ★	1.02	1MB/6.0		Free
Ferrari Grand Prix ★	1.6	512K/3.2		$10
FetchIt	2.0	512K/6.01		*
FileMaker II ★	1.1	1MB/4.2		*
FilmMaker	2.0	5MB/6.0.3		*
Finale	2.01	1MB/6.02	5/90	$5
Financial Analysis	3.0	512K/3.0		*
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Flash	1.1	1MB/6.0	8/90	Free
Fontographer	3.1	1MB/4.2	5/90	*
FontShare	2.0	1MB/6.0		Free
FormsProgrammer ★	2.03	1MB/6.02		$15
FoxBase+/Mac ★	2.10	1MB/6.0		$75
Freedom of Press ★	2.2	1MB/6.0		Free

(continues)

Bold *= first time the product is being listed.*

★ *= minor update.*

Req. *= min. RAM and system software required.*

Rev. *= last time(in past year) reviewed this or an earlier version.*

Price *= cost for update to registered owners.*

* *= contact your dealer for update policy.*

PRODUCT UPDATES

Product	V.	Req.	Rev.	Price
FreeFlow	3.0	1MB/6.03		Free
Full Impact ★	2.0	1MB/6.0		$50
FullWrite Professional ★	1.1	2MB/6.02		Free
Gamblin' Times	3.0	1MB/6.0		$10
GatorBox	1.5	NA		Free
GeoQuery	2.0	1MB/6.0	10/90	*
Gofer	2.0	1MB/4.1		$25
GQL	2.0	1MB/5.0		*
Great Gantt	1.2	1MB/6.0		Free
Great Plains Accounting Series	5.2	1MB/6.0		*
HandOff	1.2	1MB/6.0	4/90	*
Handwriting Analyst ★	3.1	512K/3.2	1/90	$24.95
Hard Disk Partition	3.02	1MB/6.0		$30
Hard Disk Util	3.0	1MB/6.0		$65
Help DA	3.0	1MB/6.0		Free
HFS Backup	3.0	512K/3.2		$35
Hybase ★	1.1	1MB/6.0		Free
HydroMac	2.0	1MB/6.0		*
HyperAnimator ★	1.5	1MB/6.03		$29.95
HyperCard ★	2.0	1MB/6.03		$49
HyperDA ★	1.2	512K/3.2		$10
HyperEngine Developer's Tool ★	1.1	1MB/6.03		Free
HyperLibrary	2.0	1MB/5.0		*
HyperPort Chess	2.0	1MB/6.0		$10
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HyperWindows ★	1.2	1MB/6.02		$20
Iconia ★	7.0	1MB/6.0		*
Icon-It	2.0	1MB/6.02	9/90	$29
Igor ★	1.1	1MB/6.0	5/90	Free
Image Grabber	2.0	1MB/6.02		Free
ImageStudio	1.5	1MB/6.0		$99
ImageWriter LQ Print Driver ★	2.0	512K/3.2		Free
In-CAD	2.0	2MB/6.0		*
InfoLogic Envelope ★	6.0	512KE/4.0		$5
Insight Expert Accounts Payable	2.2	1MB/6.0		*
Insight Expert Accounts Receivable	2.2	1MB/6.02		*
Insight Expert General Ledger	**2.2**	**1MB/4.2**		**$99**
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Instant-Expert Plus	3.0	1MB/5.0		Free
JetLink Express ★	1.01	1MB/6.0		Free
KidsTime ★	1.2	512K/3.2		$15
KiwiEnvelopes	3.0	512KE/4.1		$10
Language Systems Fortran ★	**2.1**	**1MB/6.03**		*
LAN Package	3.1	1MB/6.0		*
LapLink Mac III	3.0	512K/2.0	7/90	*
LaserPaint Color II ★	1.02	1MB/6.03		Free
LetraStudio	1.5	2MB/6.0		$45
LetrTuck+	2.0	512K/3.2		$20
Lightspeed Color Layout System	2.0	1MB		*
Lookup	2.0	1MB/6.0	5/90	$15
LXR.TEST ★	4.0.11	1MB/6.0		Free
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Mac286	2.0	1MB/6.02		$10
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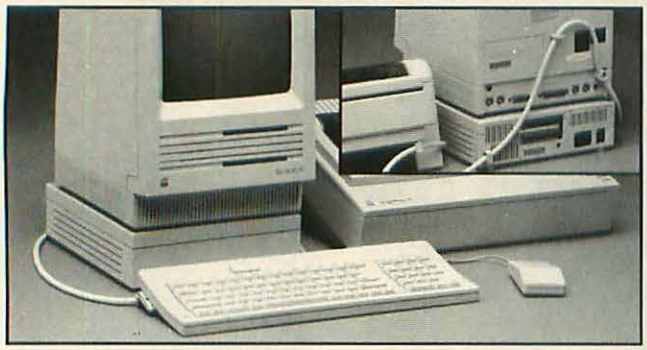

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MacFalcon	2.1	1MB/6.03		*
MacFlow ★	3.1.5	1MB/6.03		Free
MacFortran	2.4	512K/4.2		*
MacFortran/020	2.4	512K/4.2		*
MacFortran for MPW	1.1	2MB/6.02		Free
MacHerbal	2.0	512K/3.2		$49
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MacInUse	3.0	1MB/6.0		$30
MacLine	3.0	512K/3.0		$25
MacLinkPlus/Wang VS	4.0	512KE/3.2		$45
MacLotto	2.1	512K/4.0		$10
MacMainFrame 3270/CUT	2.1	2.5MB/6.02		$100
MacMoney	3.5	512KE/4.0		$12
MacPhonebook	2.0	512KE/3.2	1/90	*
MacPrint	1.1	1MB /6.02		Free
MacProject II	2.1	1MB/6.0		Free
MacProof ★	3.2.1	1MB/6.02	2/90	$30
MacRascol	2.0	2MB/4.1		$25
MacRecorder	2.0	512K/3.2	12/89	*
MacroMind Director	2.0	2MB/6.02	10/90	$100
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MacVision	3.0	1MB/6.0.2		$50
MacWrite II	1.1	1MB/6.0		Free
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MathType	2.1	512K/6.02		*
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Memorybank Manager	3.0	1MB/6.0		Free
Mesa Graphics Plotter Utility	1.03	512KE/5.0		*
Metamorphosis	**1.5**	**1MB/6.03**	**8/90**	**Free**
MGMStation ★	2.5	512KE/3.0		*
MiBAC Jazz Improvisation	1.2.2	1MB/6.0	11/90	Free
MicroPhone II	3.0	512KE/4.2	7/90	*
Microsoft Excel	2.2	1MB/6.0.2		*
Microsoft File	2.0	512K/3.2		*
Microsoft Mail	2.0	1MB/6.02	1/90	*
Microsoft PowerPoint	2.01	1MB/6.0		Free
Microsoft Word	4.0	512KE/3.2		*
Microsoft Works	2.0	512K/6.0		*
MindWrite ★	2.1	512KE/4.2		*
MiniCad +	2.0	1MB/6.0		*
MiniDraw	4.0	512KE/4.2		$17
MockPackage Plus Utilities	4.4	512KE/3.2		$15
Modern Artist	2.0	2MB/6.02		$150
MOMARS	3.1	1MB/6.03		*
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001 51000K IBM      DL/1       001
A & M RECORDS          LOS ANGELES    CA90028   2134480037C365200275
000001000104
0025000G3006101298130IBM 4341-UNK     8601M ODOS-VSE     21298069IBM
3350        016102980581BM 3420        00813298100IBM 4245        002
A & M RECORDS          LOS ANGELES    CA90028   2134480037C365200275
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The sample above shows fixed length fields and fixed length records that are common in some mainframe files. That means you can not simply tell your conversion program to drop in tab or comma delimited spaces at the end of the text in each field. For most programs converting this would be complete chaos. And that's without eliminating the duplications and extracting just the information you want.

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MusicProse	1.01	1MB/6.0	4/90	Free
Music Publisher	2.0.3	1MB/6.0		Free
MyDiskLabeler III		1MB/6.0		$25
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NanoDisk	2.0	4MB/6.04		Free
Navigate	2.0	1MB/6.0		Free
Nemesis Go Master	4.0	512K/4.1		*
Network DiskFit	1.5	512K/4.1	12/89	$30
The NightWatch ★	1.03	512KE/3.2		*
Nisus	2.0	1MB/6.02		Free
NuPaint ★	1.04	512K/3.2		Free
NuTools	1.2	1MB/6.0		*
Nutrition Stack	2.0	1MB/6.02		$20
OmniPage ★	2.1	1MB/6.02	2/90	Free
Omnis 3 Plus/Express	2.0	512KE/3.2		*
On Schedule	2.0	1MB/3.0		*
P51 Mustang Flight Simulator	2.04	512K/3.2		$10
PacerLink	5.0	512K/5.0		*
Panorama	1.5	1MB/4.2		Free
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Prograph	**2.0**	**2MB/6.0**	**8/90**	*
Property Management III		1MB/6.0.1		$100
PropsForms	2.0	1MB/6.03		Free
Prototyper ★	2.01	1MB/4.1		$79
Publish-It	1.2	512KE/5.0		*
Publish or Perish	5.0	512K/4.2		$10
Pyro	4.0	512K/4.1	7/90	$15
QuarkXPress	3.0	2MB/6.0.5	11/90	$30
Quicken ★	1.5	512K/3.2	1/90	*
QuicKeys 2		**1MB/6.02**		**$49.95**
QuickLetter ★	1.03	512KE/3.2		Free
QuickLock	2.0	512KE/3.2	10/90	Free
QuickMail	2.2	512KE/3.2		$95
QuickShare	2.0	512KE/3.2		$75
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Read-It OCR Professional	3.0	2MB/6.03		*
ReadySetGo	4.5	1MB/6.0		*
Real Estate Edge	2.0	1MB/6.03		Free
Rendezvous	2.5	512KE/4.1		$15
Reports ★	1.2	1MB/6.0		Free
Retail Engine	3.0	1MB/6.0		*
Sales and Market Forecasting Toolkit	2.0	1MB/6.0		$49
Sales Associate	1.10	1MB/6.03		Free
SAM	2.0	1MB/6.0	1/90	$29.95
ScanMan Model 32		1MB/6.0	10/90	Free
ScheduleMaker ★	3.01	1MB/6.0		$25
ScreenSnap ★	2.2	1MB/4.2		*
ScriptEdit	1.1	1MB/6.04	3/90	*
Second Sight	2.0	1MB/6.02		$33.75
Sentinel	2.2	1MB/6.0		$30
Shanghai	2.0	1MB/6.02	2/90	$13
SimMac	3.0	1MB/6.02		Free
SimpleSpan	2.5	512K/3.2		*
Smart Alarms	2.9.1	512K/3.2		$12
SmartForm Assistant	1.1	1MB/6.0		Free
SmartForm Designer	1.1	1MB/6.0		Free
SmartScrap & The Clipper	2.0	1MB/6.03		$20
Snap ★	3.1	1MB/3.0		*
SoftPC ★	1.3	2MB/6.0		*
Sound Designer Universal ★	1.5	512K/6.03		$45
Spelling Coach Professional	3.1	512KE/4.2		*
Spellswell ★	2.2	512K/3.2	5/90	$20
Spinnaker Plus	2.0	2MB/6.0		$45
Springboard Publisher	2.0	1MB/6.0		*
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StickyBusiness	1.06	512KE/6.03		Free
Still Light	3.0	1MB/6.0		Free
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Suitcase II	1.2.6	512KE/4.1		$25
Super 3D	2.1	512KE/6.02		Free
SuperGlue II with GlueNotes	2.1	1MB/6.0	1/90	*
SuperLaserSpool	2.0.2	1MB/6.0		$30
SuperPaint	2.0	1MB/6.02		$50
SuperSpool	5.0	512K/4.1		$30
Sybil	2.0	1MB/6.0	11/90	*
Synchronicity	2.0	512KE/3.2	12/89	$5
Systat	5.0	4MB/6.0		$190
Teacher's Rollbook ★	2.2	512K/3.2		$17.95
Tempo II	1.02	1MB/4.2	12/89	*
Tempo+ Tools ★	1.1	1MB/4.2		*
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ThunderWorks	1.0.3	1MB/6.0.2		$69
Timbuktu	3.1	1MB/4.1	10/90	*
Timbuktu/Remote	**2.0**	**1MB/4.1**	**3/90**	*
TimeMinder	2.0	1MB/4.2		$50
Timeslips III	2.0	1MB/6.02	2/90	*
TML Pascal II	3.0	1MB/5.0		$79.95
TMON ★	2.8.4	512K/4.0		*
TOPS/Mac	3.0	512K/3.2		*
Trapeze ★	2.1	1MB/6.0		$35
TrueBASIC ★	2.02	1MB/6.0		Free
TrueForm ★	1.1	1MB/6.2	4/90	Free
TurboCASE	2.0	1MB/6.0		$25
Turbosynth	2.0	1MB/6.03		$35
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TypeStyler	1.5	1MB/4.1	7/90	*
UNITize ★	1.3	512KE/3.2		$20
UpBeat	2.01	1MB/6.0	8/90	$75
VersaCAD/ Macintosh Edition ★	2.11	1MB/6.0		Free
Vietnam War	2.0	1MB/6.0		*
Virex	2.7	1MB/4.2	1/90	$15
Virtual 2.0 for 030	2.03	1MB/4.2		Free
Virtual 2.0 for Mac II	2.03	1MB/4.2		Free
Virtual 2.0 for Mac Plus	2.02	1MB/4.2		Free
Vision	1.1	1MB/6.03		Free
VMacS	2.0	1MB/6.0		$25
Voyager	1.2	1MB/6.0	4/90	*
Wall Street Investor	3.0	1MB/5.0		$150
White Knight II	11.6	1MB/6.02	7/90	$35
Wild Things ★	1.1	1MB/6.0		Free
WillMaker	4.0	512KE/4.2		$18.50
Wingz ★	1.1	1MB/6.0		Free
Word Finder	2.0	512K/3.2		*
WordPerfect for the Macintosh ★	1.0.3	1MB/4.2		Free
WorksPlus Command	**2.0**	**2MB/6.03**	**1/90**	**$35**
WorksPlus Spell	2.0	1MB/6.03	1/90	$35
WriteNow	2.2	512K/4.2	9/90	$49

To have products listed in this section, send upgraded software, an outline of changes since the previous release (indicate if it's a maintenance upgrade), upgrade price, minimum RAM and system software, suggested retail price, company name, mailing address, and phone number to *Updates, Macworld,* 501 Second St., San Francisco, CA 94107.

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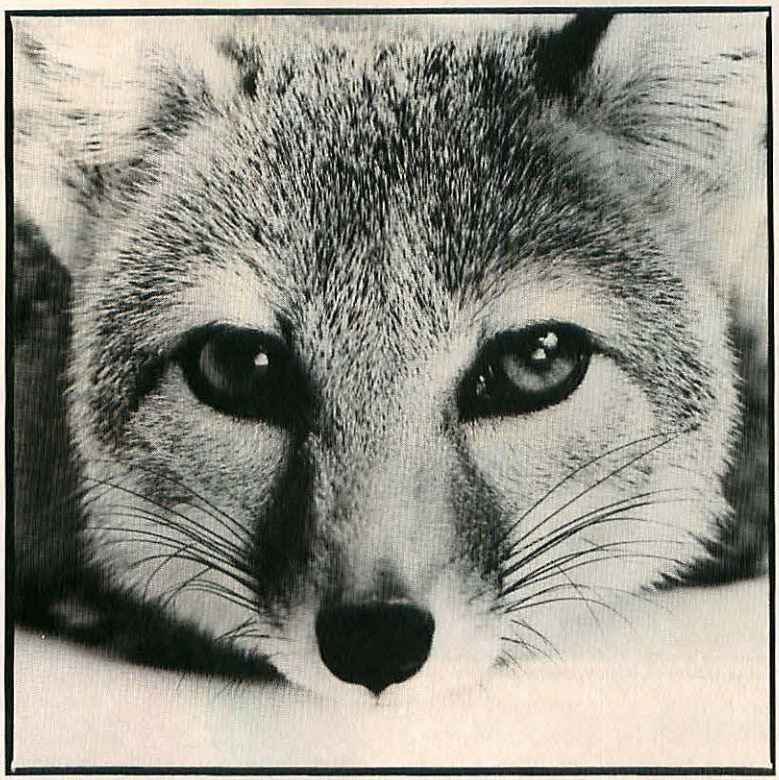

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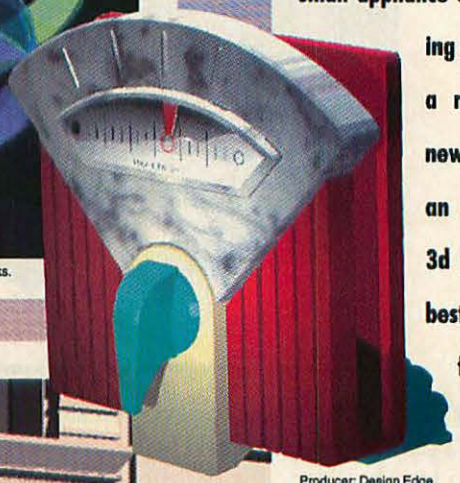

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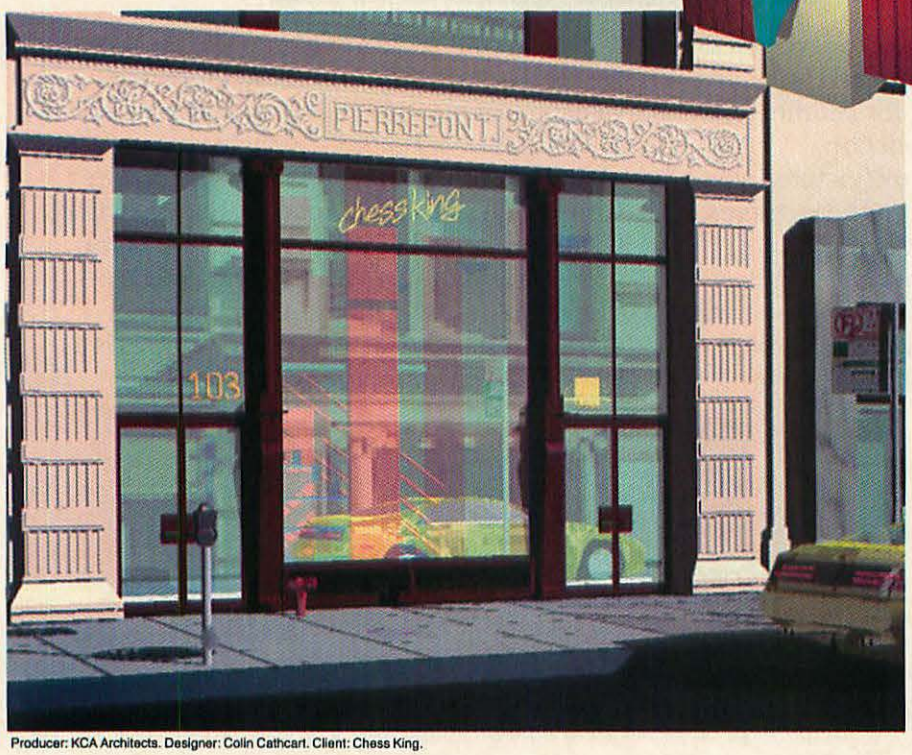

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WHERE TO BUY

A Guide to Products Featured in This Issue

This listing provides companies and phone numbers for products mentioned in this issue. Allow several weeks for responses to reader service card inquiries. Asterisks indicate vendors who prefer to be contacted by phone.

Reader Service

701 **9624 LE** Digicom Systems; 408/262-1277.

702 **9632-STH** Anderson Jacobson; 408/435-8520, 800/537-5762.

703 **9632VP** Racal-Vadic; 408/432-8008, 800/482-3427.

A

704 **A4** Softek Design; 303/728-5252.

705 **Accountant, Inc. Professional** Softsync/Bloc Publishing; 212/685-2080.

706 **ACCPAC Bedford Simply Accounting** Computer Associates; 408/432-1727, 800/531-5236.

707 **Adobe Illustrator 88** Adobe Systems; 415/961-4400, 800/833-6687.

708 **Adobe Photoshop** Adobe Systems; 415/961-4400, 800/833-6687.

709 **Aldus FreeHand** Aldus Corporation; 206/628-2320.

710 **Aldus PageMaker** Aldus Corporation; 206/628-2320.

711 **Apple Extended Keyboard II** Apple Computer; 408/996-1010.

712 **Apple Keyboard** Apple Computer; 408/996-1010.

713 **Apple Tape Backup 40SC** Apple Computer; 408/996-1010.

714 **Aranda** Soft-Set Technologies; 604/734-1622.

715 **ArchiCAD** Graphisoft USA; 415/266-8720, 800/344-3468.

716 **Architrion II** Gimeor; 202/546-8775.

717 **Ashlar-Vellum 3D** Ashlar; 408/746-3900.

718 **The Assistant Controller Series** Lake Avenue Software; 818/351-5483.

719 **The Athlete's Diary** Stevens Creek Software; 408/725-0424.

720 **atOnce** Layered; 617/242-7700, 800/622-4436.

721 **auraModeler** Aura CAD/CAM; 213/536-9207.

722 **AutoCAD** Autodesk; 415/331-0356.

723 **Aware** Database International; 508/820-0018.

B

724 **Back to Basics: Professional** Peachtree Software; 404/564-5700, 800/247-3224.

725 **Balance of the Planet** Accolade; 408/985-1700.

726 **Bass Champ** Shadowfax Software; 515/472-6621.

727 **Beyond** Dr. T's Music Software; 617/969-6657.

728 **Bulletmodem E9696M** E-Tech Research; 408/982-0270.

729 **Business Sense** Inman Software; 307/789-7257.

C

730 **CADmover** Kandu Software Corp.; 703/532-0213.

731 **Card/Fax** Compu-Quote; 818/348-3662, 800/782-6775.

732 **CAT III** Chang Labs; 408/727-8096, 800/242-6452.

733 **Champion Macintosh** Champion Business Systems; 303/278-8666, 800/243-2626.

734 **CheckWriter II** Aatrix Software; 701/746-7202, 800/426-0854.

735 **Color MacCheese** Delta Tao Software; 408/730-9336.

736 **Components** Satori Software; 206/443-0765.

737 **Compugraph** Klex Software; 313/477-6800.

738 **ComputerEyes Professional** Digital Vision; 617/329-5400.

739 **Computerized Classic Accounting** Absolute Solutions; 619/966-8000, 800/633-7666.

740 **Cordless Mouse** Practical Solutions; 602/322-6100.

741 **The Cordless Mouse** Basic Needs; 619/738-7020, 800/633-3703.

742 **Courier V.32** U.S. Robotics; 708/982-5001, 800/348-5877.

743 **CPKT-155** MicroNet Technology; 714/837-6033.

744 **Cyclist's Logbook** Heizer Software; 415/943-7667, 800/888-7667.

D

745 **DAT-1300** Pinnacle Micro; 714/472-0100, 800/553-7070.

746 **DATaVault** Tecmar, a Subsidiary of Rexon; 216/349-1009.

747 **DesignCAD 2D/3D Macintosh Edition** DesignCAD; 918/825-4848.

748 **DeskTop 596 Modem** General DataComm; 203/574-1118.

749 **DigiVideo Color** Aapps Corp.; 408/735-8550.

750 **Dimensions Presenter Professional** Visual Information Development; 818/918-8834.

751 **DiskExpress II** AlSoft; 713/353-4090.

752 **DiskTop** CE Software; 515/224-1995.

753 **DrawTools** Paracomp; 415/956-4091.

754 **The Duel: Test Drive II** Accolade; 408/985-1700.

755 **DynaPerspective** Dynaware; 415/349-5700, 800/445-3962.

E

756 **EMAC 60T** EMAC, a Division of Everex Systems; 415/683-2222, 800/821-0806.

757 **EMAC Impact Tape 150** EMAC, a Division of Everex Systems; 415/683-2222, 800/821-0806.

758 **EMAC Metro DAT** EMAC, a Division of Everex Systems; 415/683-2222, 800/821-0806.

F

759 **FasTalk V.32/V.42** UDS; 205/430-8000, 800/631-4869.

760 **Fastback Tape FB120** Fifth Generation Systems; 504/291-7221, 800/873-4384.

761 **Fast Forms** Power Up Software Corp.; 415/345-5900, 800/851-2917.

762 **FDX 9696** FastComm Communications Corp.; 703/620-3900, 800/521-2496.

763 **Felix** Altra; 307/745-7538, 800/726-6153.

764 **FileSecure 150(Mac)** Tallgrass Technologies Corp.; 913/492-6002, 800/825-4727.

765 **FileSecure 1300(Mac)** Tallgrass Technologies Corp.; 913/492-6002, 800/825-4727.

766 **Fiscal Knowledge** Mathesis; 416/588-7592.

767 **Flexware Network Accounting** Micro-

(continues)

Reader Service

financial; 818/961-0237, 800/527-6587.

G

768 **Great Plains Accounting Series** Great Plains Software; 701/281-0550, 800/456-0025.

H

769 **hammerDAT** FWB; 415/474-8055.

770 **hammerTape250** FWB; 415/474-8055.

HARD DISK DRIVES

771 Alliance Peripheral Systems; 816/478-8300, 800/233-7550.

772 Apple Computer; 408/996-1010.

773 ClubMac; 714/768-1490.

774 CMS Enhancements; 714/259-9555.

775 Deltaic Systems; 408/441-1240.

776 FWB; 415/474-8055.

777 GCC Technologies; 617/890-0880, 800/422-7777.

• Hard Drives International; 602/967-5128, 800/767-3475.

778 iDS Systems; 408/441-0500, 800/733-0078.

779 La Cie, Ltd.; 503/691-0771, 800/999-0143.

780 Liberty Systems; 408/983-1127.

781 MacProducts USA; 512/343-9560, 800/622-3475.

782 MicroNet Technology; 714/837-6033.

783 Microtech International; 203/468-6223, 800/626-4276.

784 Mirror Technologies; 612/633-4450, 800/654-5294.

785 Optima Technology; 714/476-0515.

786 PLI; 415/657-2211, 800/288-8754.

787 Procom Technology; 714/549-9449.

788 Racet Computes, Ltd.; 714/579-1725.

789 Relax Technology; 415/471-6112, 800/848-1313.

790 Rodime Systems; 407/994-5585.

791 Ruby Systems; 408/735-8668, 800/888-1668.

792 Storage Dimensions; 408/879-0300.

793 SuperMac Technology; 408/245-2202.

794 Third Wave Computing; 512/832-8282, 800/284-0486.

795 **HyperTape II** GCC Technologies; 617/890-0880, 800/422-7777.

I

796 **In-CAD** Infinite Graphics, 612/721-6283.

797 **In-House Accountant** In-House Software; 805/481-7822.

798 **Insight Expert Accounting Series** Layered; 617/242-7700, 800/622-4436.

799 **Insight OneWrite** Layered; 617/242-7700, 800/622-4436.

800 **Inspiration** Ceres Software; 503/245-9011.

801 **Irwin Model 5040** Irwin Magnetic Systems; 313/930-9000, 800/421-1879.

802 **Irwin Model 5080** Irwin Magnetic Systems; 313/930-9000, 800/421-1879.

803 **IS/Series** Kurta Corp.; 602/276-5533, 800/445-8782.

J

804 **Jack Nicklaus' Greatest 18 Holes** Accolade; 408/985-1700.

805 **Jetstream** PCPC; 813/884-3092.

L

806 **LetterForms & Illusion** W.H. Freeman and Company; 212/576-9400.

807 **Little Mouse ADB** Mouse Systems Corp.; 415/656-1117.

808 **lynx Turbo Trackball** lynx Computer Products; 213/590-9990, 800/321-5969.

M

809 **M-1.2TDAT** Maxcess; 215/928-1213, 800/356-2892.

810 **Mac-101** Datadesk International; 818/998-4200, 800/826-5398.

811 **M150T** Maxcess; 215/928-1213, 800/356-2892.

811 **M250T** Maxcess; 215/928-1213, 800/356-2892.

812 **MacBack 128** ADIC; 206/881-8004, 800/336-1233.

812 **MacBack 256** ADIC; 206/881-8004, 800/336-1233.

812 **MacBack 8000** ADIC; 206/881-8004, 800/336-1233.

813 **MacBravo Detailer** Schlumberger; 313/995-6000, 800/366-0060.

813 **MacBravo Modeler** Schlumberger; 313/995-6000, 800/366-0060.

814 **MacConcept** Klex Software; 313/477-6800.

815 **Mach IV Plus** CH Products; 619/598-2518.

816 **MacInTax** SoftView; 805/385-5000, 800/622-6829.

817 **MacMoney** Survivor Software Ltd.; 213/410-9527.

818 **MacPro** key tronic; 509/927-5515, 800/262-6006.

• **MacSAP III** Softing, Via Reggio Calabria, 6 Rome, Italy 00161.

819 **Mac/Series Six Plus** SBT Corp.; 415/331-9900.

820 **MacStack Tape 60** CMS Enhancements; 714/259-9555.

820 **MacStack Tape 150** CMS Enhancements; 714/259-9555.

• **MacSurf** Graphic Magic; P.O.Box 185, Cottlesloe, Perth, Australia 6011.

821 **MacTape/SCSI-9** Blackhole Technology; 617/721-7690, 800/227-1688.

822 **MacTrac ADB** Micro-Speed; 415/490-1403, 800/232-7888.

823 **MagicTape 1.3 GB** MacProducts USA; 512/343-9560, 800/622-3475.

823 **MagicTape 60** MacProducts USA; 512/343-9560, 800/622-3475.

823 **MagicTape 150** MacProducts USA; 512/343-9560, 800/622-3475.

824 **Managing Your Money** MECA Software; 203/226-2400.

825 **Manapro Accounting Software** Manapro; 305/486-5900, 800/833-4776.

826 **MarkUp** Mainstay; 818/991-6540.

827 **MaxStream 60** Maynard Electronics; 407/263-3500, 800/821-8782.

827 **MaxStream 150** Maynard Electronics; 407/263-3500, 800/821-8782.

827 **MaxStream 250Q** Maynard Electronics; 407/263-3500, 800/821-8782.

827 **MaxStream 2200HS** Maynard Electronics; 407/263-3500, 800/821-8782.

828 **MD-1300** MicroNet Technology; 714/837-6033.

829 **(MDA) Multiuser Desktop Accounting** Logisoft; 415/939-3556.

830 **MDAT 1300/M** Procom Technology; 714/549-9449.

831 **MiBAC Jazz** MiBAC Music Software; 507/645-5851.

832 **MicroPhone II** Software Ventures Corp.; 415/644-3232.

833 **MicroStation Mac** Intergraph Corp.; 205/730-2000, 800/345-4856.

834 **MiniCAD+** Graphsoft; 301/461-9488.

835 **Minimum Requirements** Spreadware; 415/794-4388.

836 **Model 2264** Codex Corp.; 508/261-4000.

837 **ModelShop** Paracomp; 415/956-4091.

838 **MouseStick** Advanced Gravis Computer Tech. Ltd.; 604/434-7274, 800/663-8668.

839 **MPT-155** MicroNet Technology; 714/837-6033.

839 **MT-150** MicroNet Technology; 714/837-6033.

839 **MT-155** MicroNet Technology; 714/837-6033.

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839 **MT-320** MicroNet Technology; 714/837-6033.

840 **MultiLedger** CheckMark Software; 303/484-3541, 800/444-9922.

841 **MultiModem V32** Multi-Tech Systems; 612/785-3500, 800/328-9717.

842 **M.Y.O.B** Teleware; 201/334-1353, 800/322-6962.

N

843 **N9631** NEC America; Data & Video Division; 408/433-1250, 800/222-4632.

844 **NetModem V.32** Shiva Corp.; 617/864-8500, 800/458-3550.

O

• **OmniMac Ultra** Northgate Computer Systems; 612/476-4400, 800/548-1993.

P

845 **PEGASYS II** IGC Technology Corp.; 415/563-3612.

846 **Personal Writer 15SL** Personal Writer; 213/556-1001, 800/322-4744.

847 **Phaser PX Color Printer** Tektronix; 503/682-7377, 800/835-6100.

848 **PixelPaint Professional** SuperMac Technology; 408/245-2202.

849 **Plains & Simple One-Write** Great Plains Software; 701/281-0550, 800/456-0025.

850 **PL DAT** PLI; 415/657-2211, 800/288-8754.

851 **PMT 60/M** Procom Technology; 714/549-9449.

851 **PMT 150/M** Procom Technology; 714/549-9449.

852 **PowerKey** Sophisticated Circuits; 206/485-7979, 800/827-4669.

853 **ProModem 9600** Prometheus Products; 503/624-0571, 800/477-3473.

854 **Pro Plus Accounting** Pro Plus Software; 602/461-3296, 800/227-5728.

855 **ProPoint** Abaton, a Subsidiary of Everex Systems; 415/683-2226, 800/444-5321.

Q

856 **QT-525es** Tecmar, a Subsidiary of Rexon; 216/349-1009.

856 **QT-Mac40** Tecmar, a Subsidiary of Rexon; 216/349-1009.

856 **QT-Mac80** Tecmar, a Subsidiary of Rexon; 216/349-1009.

856 **QT-Mac150** Tecmar, a Subsidiary of Rexon; 216/349-1009.

857 **QuarkXPress** Quark; 303/934-2211, 800/356-9363.

• **Quicken** Intuit; 415/322-0573, 800/624-8742.

858 **QuicKeys** CE Software; 515/224-1995.

859 **QX/3296c** Microcom; 617/551-1000, 800/822-8224.

R

860 **Rags to Riches** Chang Labs; 408/727-8096, 800/242-6452.

861 **Remote/V.32 Modem** Farallon Computing; 415/596-9100.

862 **Retrospect** Dantz Development Corp.; 415/849-0293.

863 **RMD 3221** Racal-Milgo; 305/846-1601, 800/327-7909.

863 **RMD 3222** Racal-Milgo; 305/846-1601, 800/327-7909.

S

864 **SA525** Racet Computes, Ltd.; 714/579-1725.

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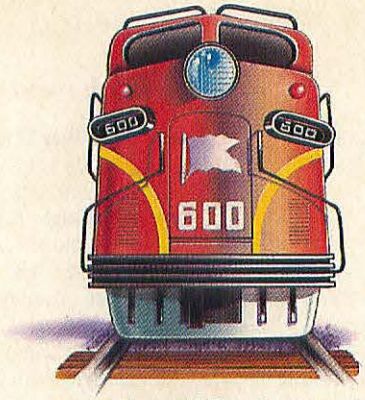

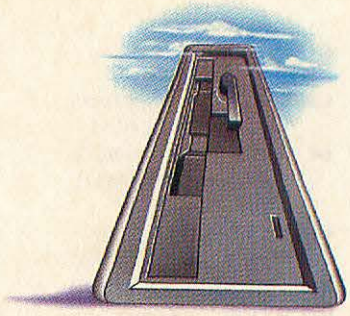

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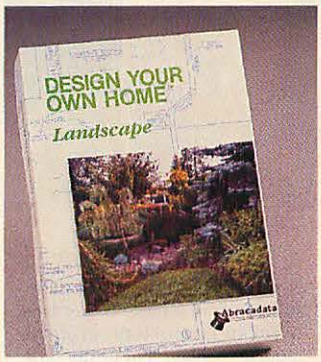

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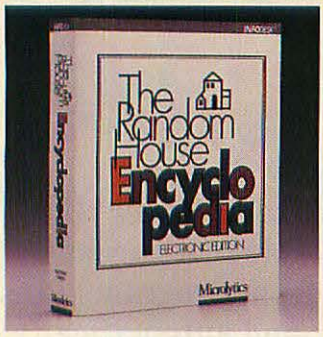

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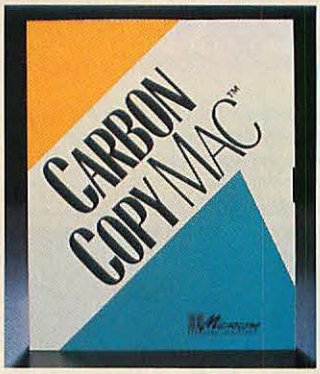

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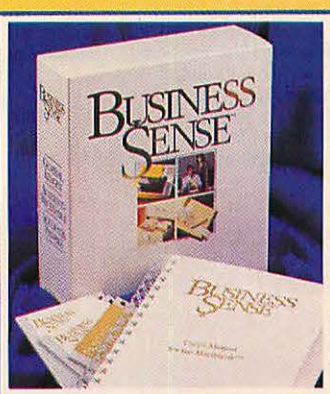

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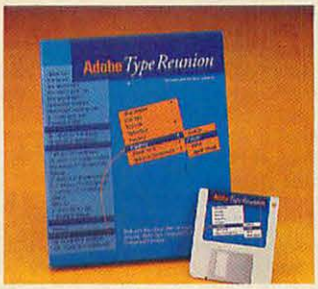

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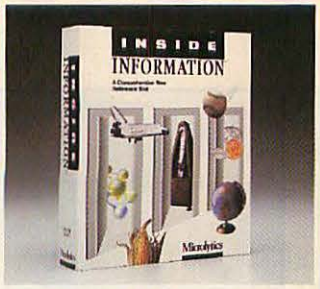

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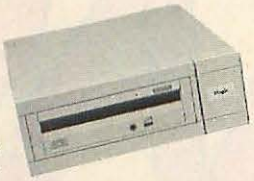

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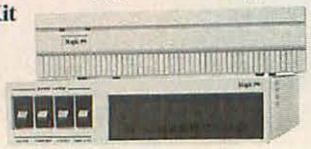

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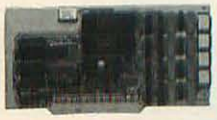

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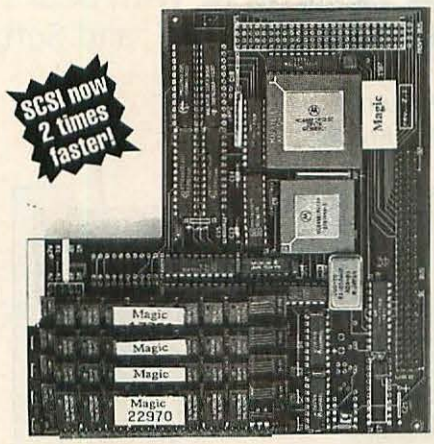

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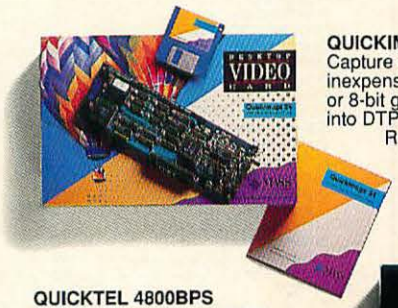

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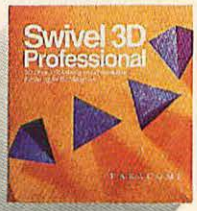

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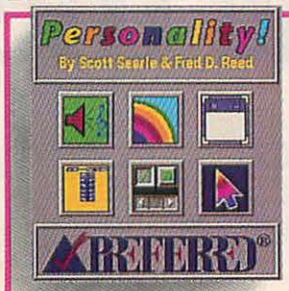

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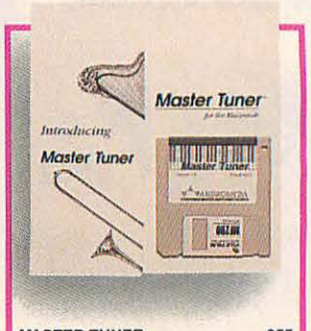

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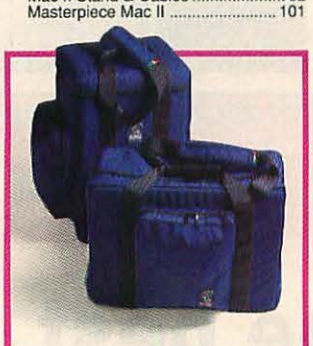

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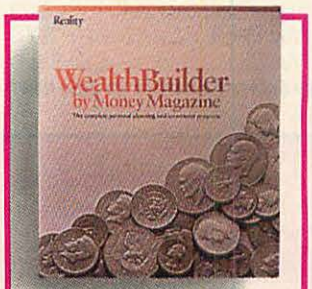

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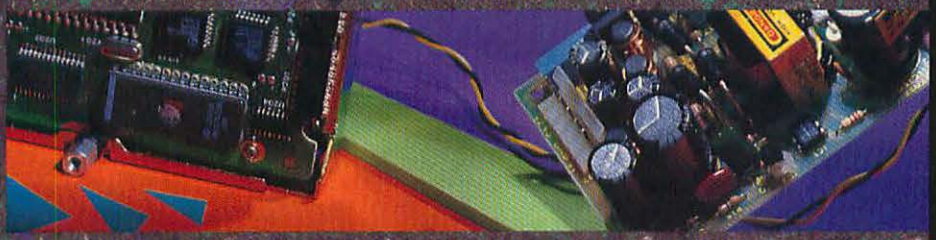

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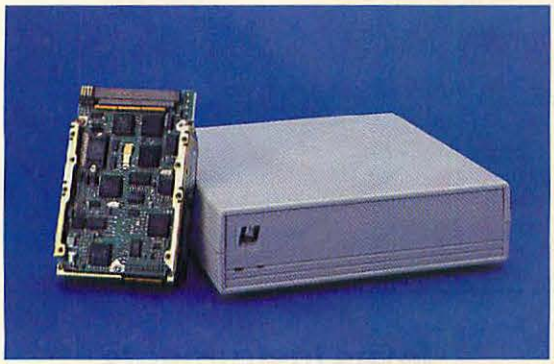

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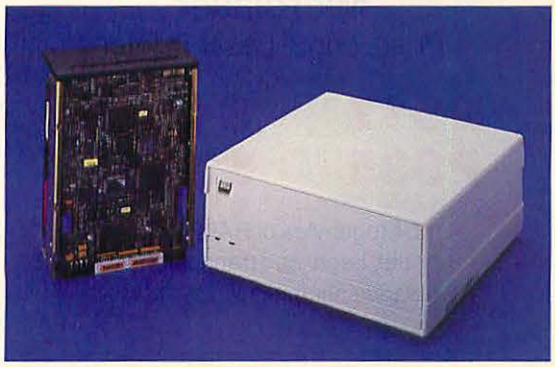

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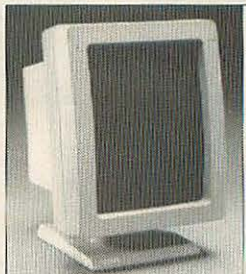

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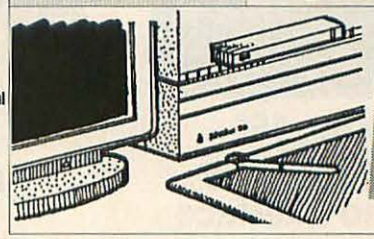

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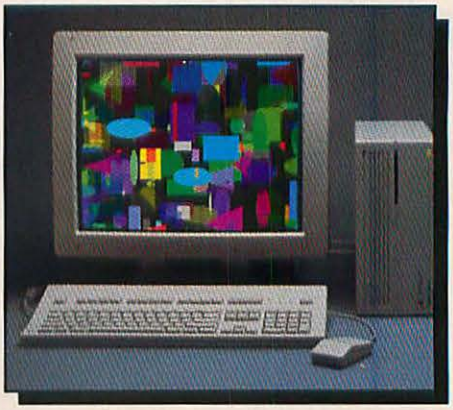

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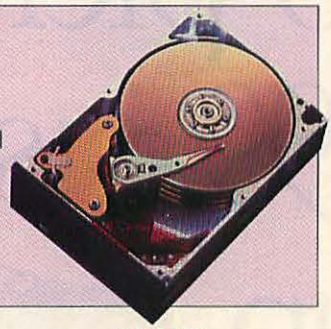

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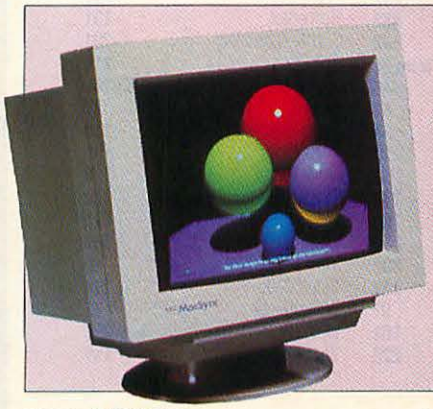

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Display ads are sold by column inches (2" minimum). Standard red is available as a second color. Text-only listings are available for a minimum of three issues at $450 per issue.

For more information on *The Macworld Catalog*, **call 800/888-8622.**

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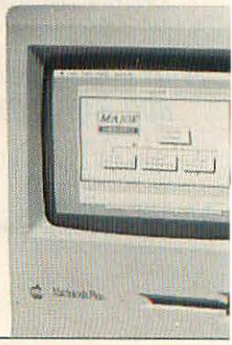

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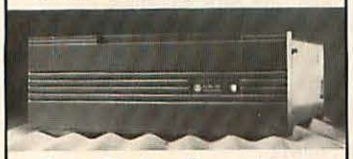

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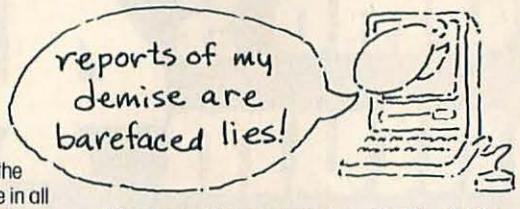

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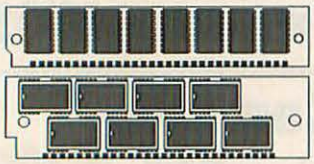

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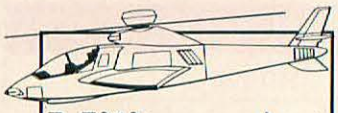

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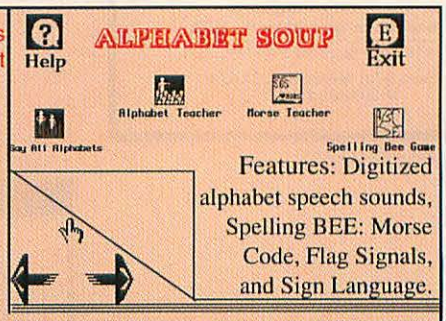

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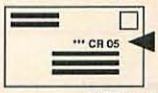

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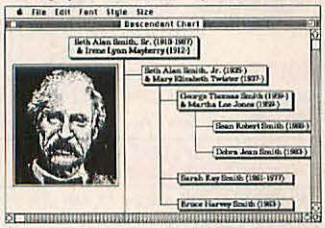

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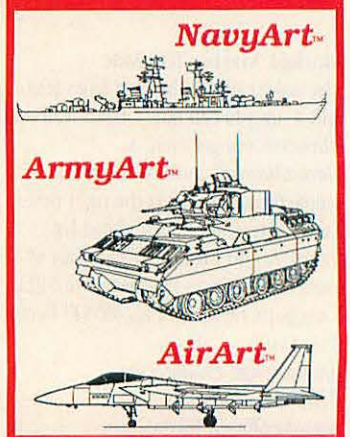

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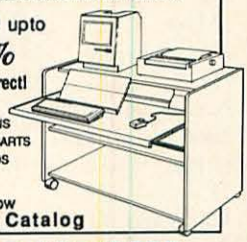

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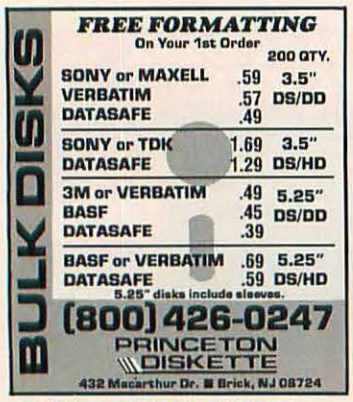

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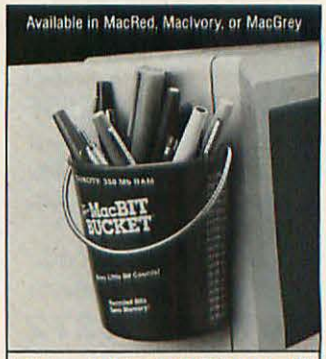

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Months on chart	Last month	This month		
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57	3	2	**Microsoft Excel**	Microsoft
45	2	3	**Microsoft Works**	Microsoft
53	4	4	**Aldus PageMaker**	Aldus
42	6	5	**MacWrite II**	Claris
6	5	6	**Quicken**	Intuit
18	7	7	**FileMaker II**	Claris
19	9	8	**QuarkXPress**	Quark
11	—	9	**Aldus FreeHand**	Aldus
51	10	10	**MacDraw**	Claris

EDUCATION SOFTWARE

Months on chart	Last month	This month		
33	2	1	**Reader Rabbit**	The Learning Company
20	1	2	**Where in the World Is Carmen Sandiego?**	Brøderbund
7	5	3	**Where in the USA Is Carmen Sandiego?**	Brøderbund
48	3	4	**Math Blaster**	Davidson & Associates
11	4	5	**Math Rabbit**	The Learning Company

ENTERTAINMENT SOFTWARE

Months on chart	Last month	This month		
11	2	1	**SimCity**	Maxis Software
9	1	2	**Tetris**	Spectrum HoloByte
20	—	3	**Falcon**	Spectrum HoloByte
3	4	4	**Welltris**	Spectrum HoloByte
11	5	5	**Crystal Quest**	Casady & Greene

NETWORK/DATA COMMUNICATIONS

Months on chart	Last month	This month		
45	1	1	**TOPS**	Sitka Corporation
40	2	2	**AppleShare**	Apple Computer
6	3	3	**MicroPhone II**	Software Ventures
2	4	4	**Timbuktu**	Farallon Computing
10	—	5	**MacLink Plus**	DataViz

HARD DISKS*

Months on chart	Last month	This month		
9	1	1	**MacStack SD40**	CMS Enhancements
24	2	2	**MacStack SD20**	CMS Enhancements
11	3	3	**MacStack SD30**	CMS Enhancements
1	—	4	**MicroNet External 20**	MicroNet
35	—	5	**Apple Hard Disk 20SC**	Apple Computer

ADD-IN BOARDS/MEMORY

Months on chart	Last month	This month		
5	4	1	**ColorBoard 264**	RasterOps
1	—	2	**Pivot**	Radius
2	3	3	**Radius TPD Interface**	Radius
2	1	4	**Radius Accelerator 16/SE**	Radius
3	2	5	**Radius DirectColor 24**	Radius

UTILITY SOFTWARE

Months on chart	Last month	This month		
7	1	1	**SAM II**	Symantec
7	2	2	**SUM II**	Symantec
1	—	3	**Norton Utilities for the Macintosh**	Peter Norton Computing
1	—	4	**Macintosh Tools Deluxe**	Central Point Software
7	3	5	**Adobe Type Manager**	Adobe

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Recent or forthcoming products of particular interest.

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Gold Brick *Transfinite Systems*
ADB component and software for adding controllers to a Mac

MacTopas *AT&T Graphics Software lab*
3-D modeling and rendering software

Source: Exclusive InfoCorp survey of more than 150 Macintosh retailers and selected mail-order vendors. Covers sales during June 1990.

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- Silverlining Universal Hard Disk Management - ★★★★½ mice rating by MacUser
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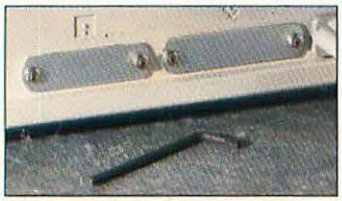
Circle 251 on reader service card

RESTRICTED AREA

Your data is *your* data. And to keep it that way Kensington introduces PassProof™ — the first complete data protection system for the Macintosh®.

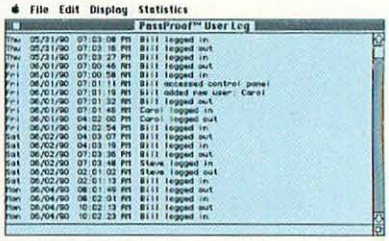


First, the hardware.

A rugged cylindrical lock keeps your disk drive safe from intruders. Two sturdy metal plates with tamper-proof screws block both rear-floppy and SCSI ports.

Next, the software.

As the master user you assign yourself a master password. From then on, you use the password as your key to unlock the system. You can add or delete additional users whenever you want. And PassProof's User Log keeps track of every attempt to use your Mac.



Want to "lock up" in a hurry? Quick Cover™ is PassProof's screen-locking program that lets you secure your Mac on command.

Best of all PassProof is user friendly.

Unless, of course, the user is unauthorized.

Ask your dealer about other Kensington accessories including cable and lock systems for all Apple and Macintosh computers, including the Mac Portable and the LaserWriter® II. Or call for a free brochure at 800-535-4242. Outside the U.S., call 212-475-5200.

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